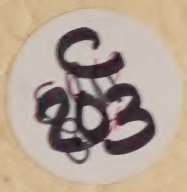
OPERATING INSTRUCTIONS



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TYPE 1114-A

FREQUENCY DIVIDER

TYPE 1114-A

TYPE 1114-A

GENERAL RADIO COMPANY

A

OPERATING INSTRUCTIONS

TYPE 1114-A

FREQUENCY DIVIDER

Form 1114-0100-A
October, 1965

GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

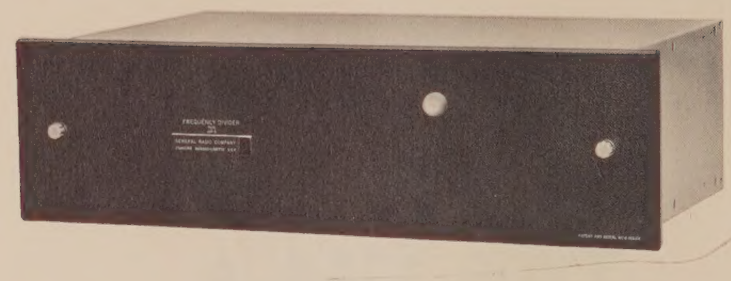


Figure 1-1. Panel view of the Type 1114-A Frequency Divider

SPECIFICATIONS

Input: 5 Mc/s, 1 Mc/s, 100 kc/s, 50 Ω, 1 V ± 50%.

Output (with 5-Mc input):

Sine Waves —

1 Mc/s, 100 kc/s } 1 V { +50% / −10% } into 50 Ω

10 kc/s, 1 kc/s, 100 c/s } 1 V { +50% / −10% } into 600 Ω

*400 c/s, *60 c/s } 1 V { +50% / −10% } into 600 Ω

* Optional accessories.

Square Waves — 100 kc/s, 10 kc/s } Approximately 7 V, p-to-p, open circuit

Spurious Signals: Better than 34 dB down.

Jitter: <0.5 ns for 100-cycle output with respect to 5-Mc input.

Optional Frequencies: 400 c/s; 60 c/s. See below.

Power Required: 105 to 130 or 210 to 260 V, 50 to 400 c/s; approximately 7 W.

Mechanical Data: Rack-bench Cabinet.

Model	*Width*		*Height*		*Depth*		*Net Wt*		*Ship Wt*	
	in	*mm*	*in*	*mm*	*in*	*mm*	*lb*	*kg*	*lb*	*kg*
Bench	19	485	5¼	135	11½	295	15	7	22	10
Rack	19	485	5¼	135	11*	280	15	7	22	10

* Behind panel.

See also *General Radio Experimenter*, April 1961.
U.S.Patent No. 2,548,457

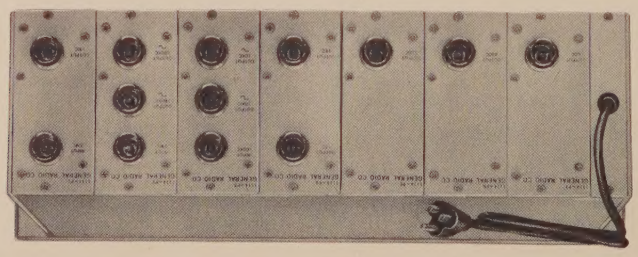


Figure 1-2. Rear view of the frequency divider, showing the plug-in units.

SECTION **1**

INTRODUCTION

1.1 DESCRIPTION.

The Type 1114-A Frequency Divider converts an input signal of 5 Mc/s, 1 Mc/s, or 100 kc/s into fundamental frequencies of 1 Mc/s, 100 kc/s, 10 kc/s, 1 kc/s and 100 c/s. Optional plug-in units for 400 c/s and 60 c/s are available. Figure 1-3 is a block diagram of the divider. The 5:1-Mc/s divider is a regenerative modulator system, while the lower-frequency dividers are of the switching type. The divider is completely monostable – there is no output when the driving signal is absent. All output frequencies are available as sine waves.

The regenerative Type 1114-P1 unit divides the 5- or 2.5- Mc/s frequency to 1 Mc/s. Each of the following units (Types 1114-P2 through -P5) divides by 10. The optional 400-cycle unit (Type 1114-P6) selects the second harmonic of a 200-cycle signal, and the optional 60-cycle unit (Type 1114-P7) divides 200 by 10 and selects the third harmonic of the 20-cycle signal.

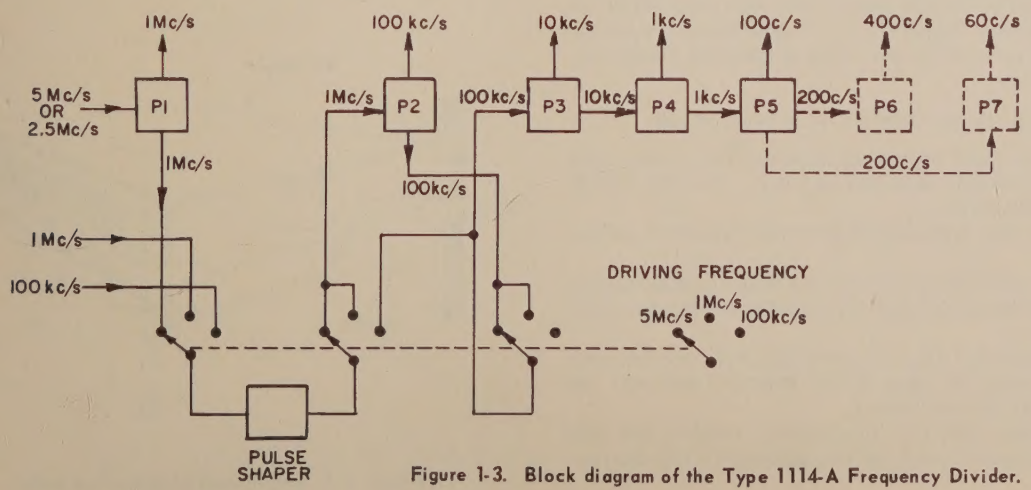


Figure 1-3. Block diagram of the Type 1114-A Frequency Divider.

SECTION **2**

OPERATING PROCEDURE

2.1 MOUNTING.

The instrument is available equipped for either bench or relay-rack mounting. For bench mounting, aluminum end frames are supplied to fit the ends of the cabinet. Each end frame is attached to the instrument with a panel screw and four 10-32 round-head screws with notched washers.

For rack mounting, special rack-mounting brackets are supplied to attach the cabinet and instrument to the relay-rack (see Figure 2-1). These brackets permit either cabinet or instrument to be withdrawn independently of the other.

To install the instrument in a relay-rack:

a. Attach each mounting bracket (A) to the rack with two 10-32 round-head screws (B). Use the inside holes on the brackets.

b. Slide the instrument onto the brackets as far as it will go.

c. Insert the two panel screws with attached washers (C) through the panel and the bracket and thread them into the rack.

d. Toward the rear of each bracket, put a thumb screw (D) through the slot in the bracket and into the hole in the side of the cabinet.

e. On the rear of the cabinet, remove the two round-head screws that hold the cabinet to the instrument.

To remove the instrument from the rack, remove only the two panel screws with washers (C) and draw the instrument forward out of the rack. To remove the cabinet and leave the instrument mounted in the rack, remove only the two thumb screws (D) at the rear of the brackets and pull the cabinet back off the instrument from the rear of the rack.

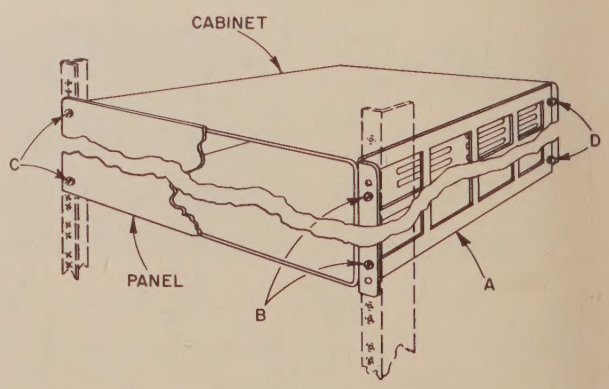


Figure 2-1. Installation of relay-rack model.

2.2 POWER REQUIREMENTS.

2.2.1 NORMAL OPERATION.

The Type 1114-A Frequency Divider can be driven by any oscillator capable of supplying 1 volt rms into 50 ohms at 5 Mc/s, 1 Mc/s, or 100 kc/s. At 5 Mc/s, the input should be sinusoidal; at 1 Mc/s and 100 kc/s, square waves and pulses can be used. The input voltage requirement for nonsinusoidal waveforms is from 1.5 to 5 volts peak-to-peak. With nonsinusoidal waveforms, it is important that the pulse shaper be adjusted as described in paragraph 4.3.2.

The DRIVING FREQ switch behind the front panel of the Type 1114-A should be set to the appropriate position, and the signal applied to the appropriate input connector (5 Mc/s, 1 Mc/s, or 100 kc/s). As part of a Type 1120 system, the unit is driven by a 5-Mc/s input from the Type 1113-A and the switch should always be in the 5 Mc/s position.

2.2.2 230-VOLT OPERATION.

The Type 1114-A is normally supplied for 115-volt operation. For 230-volt use, the following changes must be made. On the transformer terminal board on top of the power supply, remove the two jumpers (terminals 1 to 3 and 2 to 4), and connect an insulated jumper between terminals 2 and 3. Replace the 0.1-amp slow-blow fuse with one rated at 0.05 amp.

2.2.3 BATTERY OPERATION.

The Type 1114-A can be operated from a 20-to-30-volt battery if the positive side is grounded. Remove the line cord and replace with a cable suitable for battery connection (the line cord may be used if the ac line plug is removed and replaced with a suitable terminal that cannot accidentally connect to the power line). Unsolder the two connections at the left-hand side of the fuse holder. Connect the fuse in the negative lead through a diode to the emitter of the power transistor Q806 or any equivalent point.

The diode protects the circuit from reversed battery polarity. If it is left out, the regulator will be damaged instantly if the wrong polarity is applied. The diode may be any unit with an inverse rating of at least 50 volts and average forward current of 250 ma. A 1N1692 is suitable.

SECTION **3**

PRINCIPLES OF OPERATION

3.1 REGENERATIVE DIVIDER.

The 5:1-Mc/s regenerative divider is shown in elementary form in Figure 3-1. To explain its operation, let us assume the presence of a small 1-Mc/s noise voltage in the 1-Mc/s circuit. This is multiplied to 4-Mc/s, which is fed back to the mixer and heterodyned with the 5-Mc/s input, increasing the 1-Mc/s output. This action is regenerative and may be compared with the starting of an oscillator.

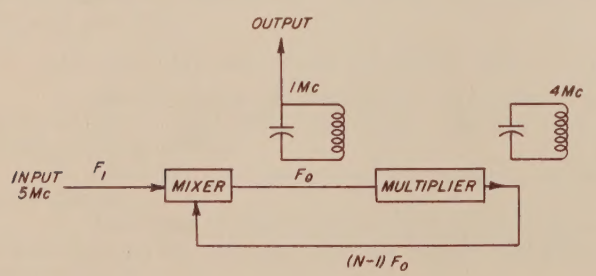


Figure 3-1. Block diagram of the Type 1114-P1 regenerative divider.

This regenerative process produces a 1-Mc/s sine wave output, which is formed into pulses to drive the lower-frequency switching-type dividers. If a 1-Mc/s or 100-kc/s input is used, the pulses are generated at the input frequency. The operating conditions of the circuit are set to obtain limiting on a few tenths of a volt input, and the output is essentially constant over 5:1 drive range. For 2.5-Mc/s input, the mixer generates the 5-Mc/s second harmonic and works as described above, dividing effectively by 2/5.

3.2 LOWER-FREQUENCY DIVIDERS.

The lower-frequency dividers are of the "switching" type. Figure 3-2 is a block diagram. The input signal, a square wave, is differentiated. The trigger generator is an amplifier generating short, positive trigger pulses. They are used to drive a monostable multivibrator (one-shot). The time constant of this circuit is chosen to reset at every fifth trigger pulse. Hence, one output pulse is generated for every five input pulses. The next stage is a bistable multivibrator (flip-flop). The square wave from this flip-flop is one tenth of the input frequency. A narrow-band filter selects the fundamental component that is available at the output terminal.

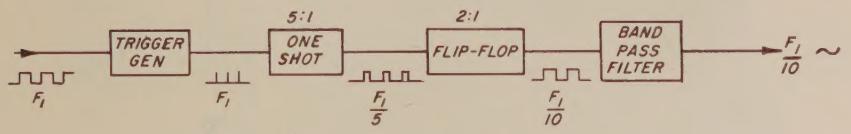


Figure 3-2. Typical switching divider for lower frequencies.

Below 1 Mc/s, switching dividers have high phase stability so that the output signals can be used for the generation of high-order harmonic spectra with a minimum of phase modulation. For such applications, square-wave outputs are provided at 100 kc/s and 10 kc/s in addition to the sine-wave outputs.

3.3 STABILITY.

The phase stability of the divider may be expressed in two ways: either in degrees phase angle of the output, or in terms of absolute time variation (jitter). Switching dividers may be assumed to have constant rise time regardless of fundamental frequency so that the time jitter remains invariant. This means that the phase noise is reduced by an order of magnitude for each 10:1 division. Given an over-all division ratio of 1000, say from 1 Mc/s to 1 kc/s, and assuming that for each stage a switching divider contributed 1 ns, then we will have a total of 3 ns time jitter at the 1-kc/s output.

While this hypothetical example is for illustrative purposes only, measurements have shown similar jitter results with such circuits. A typical figure for the circuits of the Type 1114-A is an average of 0.05 ns of jitter per decade. The measurement was made with a sampling oscilloscope measuring the total jitter of the 100-c/s output with respect to the 5-Mc/s input.

3.4 POWER SUPPLY AND GENERAL.

Transistors are used throughout for reliability, small size, and low power consumption.

All units are powered by a single power supply of -18 volts (positive side grounded). A high-gain series regulator reduces hum and permits unregulated dc input of -20 to -30 volts. The built-in rectifier operates from 100 to 130 (or 200 to 260) volts, 50 to 400 c/s.

In cases where direct battery operation is desired, a 20- to 30-V battery may be connected to the regulator input, provided its positive side can be grounded. The total drain will be less than 200 mA (5 W at 24 V). The front panel can be removed to make test points easily accessible from the front of the relay rack. Plug-in units for the desired output frequencies are inserted from the rear.

SECTION **4**

SERVICE AND MAINTENANCE

4.1 WARRANTY.

We warrant that each new instrument sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, district office, or authorized repair agency personnel, will be repaired, or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

4.2 SERVICE.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest district office, requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.3 ADJUSTMENTS.

4.3.1 POWER SUPPLY.

To set the regulator output adjust R802 for -18 volts, as measured from the point indicated in Figure 4-1 to chassis.

4.3.2 PULSE SHAPER.

Connect a 1-Mc/s signal to the INPUT 1-Mc/s connector in back of the instrument. Set the DRIVING FREQ switch to 1 Mc. Connect an oscilloscope to the output terminal of the pulse shaper. (See Figure 4-1). Adjust R906 for best sensitivity and output waveform as shown in Figure 4-3A. Not more than 1 volt peak-to-peak drive should be required for proper operation.

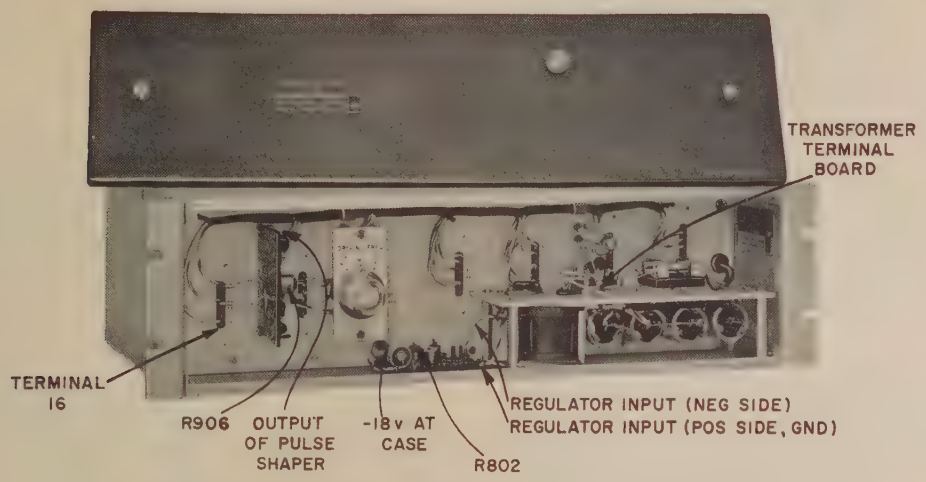


Figure 4-1. Front view of the Type 1114-A Frequency Divider.

4.3.3 TYPE 1114-P1 5-TO-1-MC DIVIDER.

a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Apply a 5-Mc/s (±1 kc/s) 1-volt rms signal to the input terminal.

c. Connect an oscilloscope to TP101.

d. Adjust trimmer capacitors C103 and C109 for a maximum 4-Mc/s signal.

e. Reduce the 5-Mc/s input to zero. The 4-Mc/s signal should disappear.

f. Slowly increase the 5-Mc/s input to 0.35 volt rms. If the 4-Mc/s signal does not appear, increase the capacitance of C109 slightly for maximum amplitude of the 4-Mc/s signal. (See Figures 4-3B and 4-3C.)

g. Vary the input from 0.3 to 1.5 volts rms and carefully observe the waveform at TP102. There must be no trace of any lower-frequency envelope over the range of input voltage. If there is, adjust C103 slightly until the 1-Mc/s output at TP102 is clean.

h. Connect a 50-ohm load to the 1-Mc/s output terminal and an oscilloscope across it. Adjust T102 for maximum amplitude.

i. Set the DRIVING FREQ switch to 5 Mc/s and connect the oscilloscope to terminal 16 on the female connector for the plug-in unit (the terminal numbers are stamped on the front of the main mounting plate). Adjust T101 for maximum amplitude.

4.3.4 TYPE 1114-P2 1-MC to 100-KC DIVIDER.

a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Connect a 5-Mc/s (±1 kc/s) 1-volt rms signal to the 5-Mc/s input terminal of the Type 1114-P1.

c. Connect an oscilloscope to TP301 and adjust R208 for a waveform as shown in Figure 4-3D.

d. Find the limits of the potentiometer (R208) setting, and set the potentiometer for the highest resistance showing proper waveform (this is near the point where the pulse duration increases).

4.3.5 TYPE 1114-P3 100-TO-10KC DIVIDER.

a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Connect a 5-Mc/s (±1 kc) 1-volt rms signal to the 5-Mc/s input terminal of the Type 1114-P1.

c. Connect an oscilloscope to TP301 and adjust R308 for a waveform as shown in Figure 4-3F.

d. Find the limits of the potentiometer (R308) setting, and set the potentiometer for the highest resistance showing proper waveform (this is near the point where the pulse duration increases).

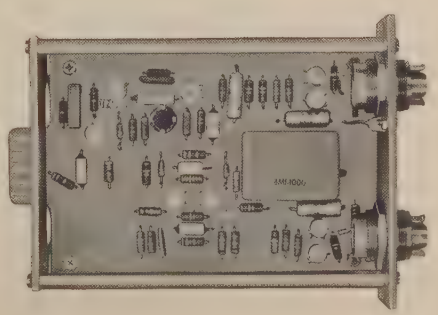


Figure 4-2. View of typical plug-in unit.

4.3.6 TYPE 1114-P4 10-TO-1-KC DIVIDER.

a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Connect a 5-Mc/s (±1 kc/s) 1-volt rms signal to the 5-Mc input terminal of the Type 1114-P1.

c. Connect an oscilloscope to TP401 and adjust R408 for a waveform as shown in Figure 4-3H.

d. Find the limits of the potentiometer (R408) setting, and set the potentiometer for the highest resistance showing proper waveform (this is near the point where the pulse duration increases).

4.3.7 TYPE 1114-P5 1-KC TO 100-CPS DIVIDER.

a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Connect a 5-Mc/s (±1 kc/s) 1-volt rms signal to the 5-Mc/s input terminal of the Type 1114-P1.

c. Connect an oscilloscope to TP501 and adjust R509 for a waveform as shown in Figure 4-3J.

d. Find the limits of the potentiometer (R509) setting, and set the potentiometer for the highest resistance showing proper waveform (this is near the point where the pulse duration increases).

4.3.8 TYPE 1114-P6 400-CPS UNIT.

No adjustment of this unit should be required.

4.3.9 TYPE 1114-P7 60-CPS DIVIDER.

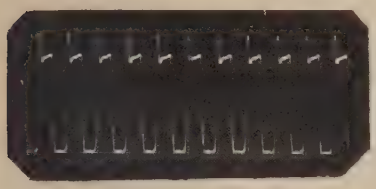
a. Remove the unit from the cabinet and connect it to the assembly using the Type 1114-P9 Servicing Extension.

b. Connect a 5-Mc/s (±1 kc/s) 1-volt rms signal to the 5-Mc/s input terminal of the Type 1114-P1.

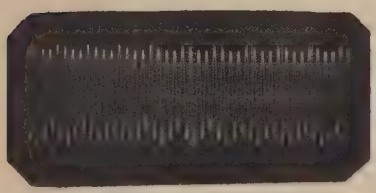
c. Connect an oscilloscope to TP701 and adjust R703 for a waveform as shown in Figure 4-3L.

d. Find the limits of the potentiometer (R703) setting, and set the potentiometer for the highest resistance showing proper waveform (this is near the point where the pulse duration increases).

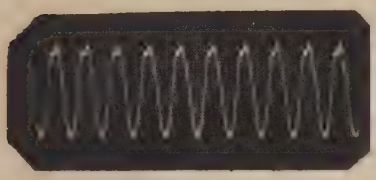
Figure 4-3. Waveforms for proper operating conditions at test points in the Type 1114-A Frequency Divider.



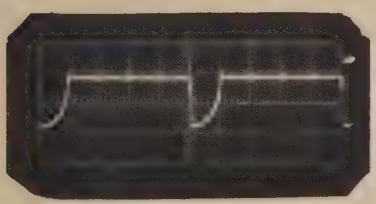
A. Output of pulse shaper. 1 μs/cm, 2 V/cm.



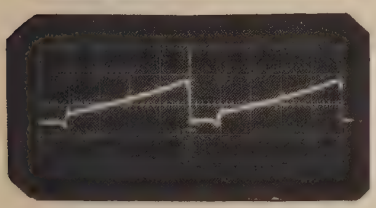
B. TP101
1 μs/cm,
0.5V/cm.



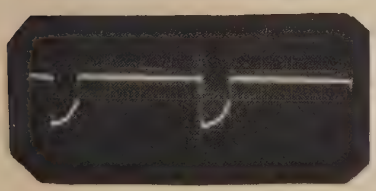
C. TP102.
1 μs/cm,
0.5V/cm.



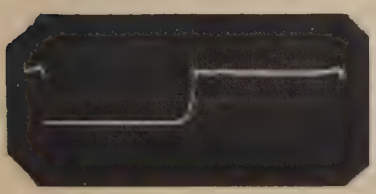
D. TP201
1 μs/cm,
5V/cm.



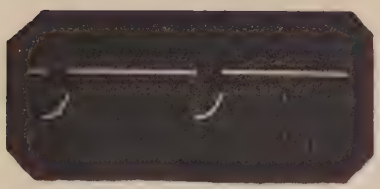
E. TP202
1 μs/cm,
5V/cm.



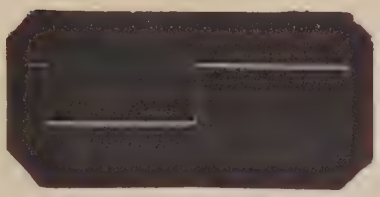
F. TP301
10 μs/cm,
5V/cm.



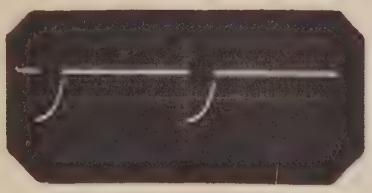
G. TP302
10 μs/cm,
5V/cm.



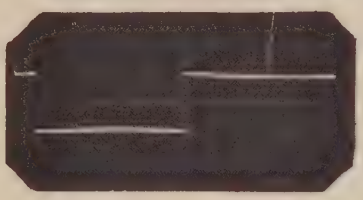
H. TP401
100 μs/cm,
5V/cm.



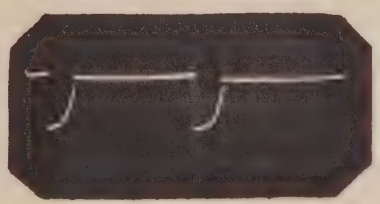
I. TP402.
100 μs/cm,
5V/cm.



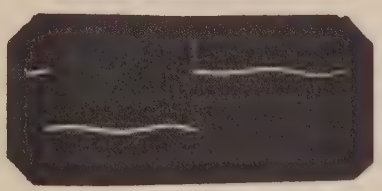
J. TP501.
1 ms/cm,
5V/cm.



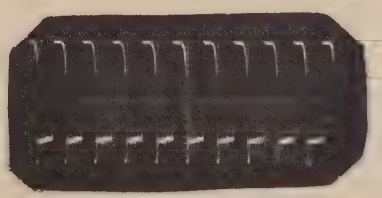
K. TP502.
1 ms/cm,
5V/cm.



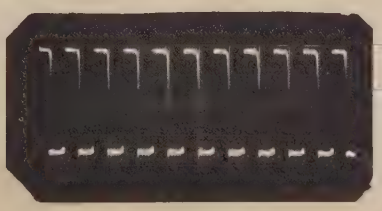
L. TP701.
5 ms/cm,
5V/cm.



M. TP702.
5 ms/cm,
5V/cm.



N. 100 KC ⊓ output. 10 μs/cm, 2V/cm.



O. 10 KC ⊓ output. 100 μs/cm, 2V/cm.

TABLE 4-1. VOLTAGE AND RESISTANCE MEASUREMENTS FOR TYPE 1114-A.

TRANSISTOR (TYPE)	PIN	DC VOLTS
Q101 (2N1396)	E	-0.3
	B	-0.4
	C	-18
Q102 (2N1372)	E	-2.6
	B	-2.8
	C	-18
Q103 (2N1396)	E	-0.3
	B	-0.9
	C	-18
Q104 (2N1372)	E	-2.6
	B	-2.8
	C	-1.8
Q201 (2N645A)	E	0
	B	0
	C	-18
Q202 (2N582)	E	-9
	B	-8.8
	C	-18
Q203 (2N779)	E	-10.2
	B	-9.6
	C	-10.3
Q204 (2N582)	E	-6.5
	B	-7
	C	-7
Q205 (2N582)	E	-6.5
	B	-5
	C	-16
Q206 (2N169A)	E	-16.1
	B	-16.1
	C	0
Q207 (2N1372)	E	-2.3
	B	-2.5
	C	-18
Q208 (2N169A)	E	-7.7
	B	-7.4
	C	-7.4
Q301 (2N582)	E	0
	B	0
	C	-18
Q302 (2N404)	E	-9.5
	B	-9.1
	C	-18
Q303 (2N520A)	E	-9.5
	B	-9.8
	C	-9.6
Q304 (2N404)	E	-6.5
	B	-7
	C	-7
Q305 (2N404)	E	-6.5
	B	-5
	C	-16
Q306 (2N1374)	E	-9
	B	-9.1
	C	-18
Q307 (2N1374)	E	-8.8
	B	-9
	C	-18
Q308 (2N169A)	E	-7.7
	B	-7.4
	C	-7.4
Q401 (2N404)	E	0
	B	0
	C	-18
Q402 (2N404)	E	-9.4
	B	-9
	C	-18
Q403 (2N520A)	E	-9.4
	B	-9.6
	C	-9.5
Q404 (2N404)	E	-6.5
	B	-7
	C	-7
Q405 (2N404)	E	-6.5
	B	-5
	C	-16
Q406 (2N1374)	E	-8.9
	B	-9
	C	-18
Q407 (2N1374)	E	-8.8
	B	-8.9
	C	-18
Q408 (2N1374)	E	-8.9
	B	-9
	C	-18
Q409 (2N1374)	E	-8.8
	B	-8.9
	C	-18
Q501 (2N404)	E	0
	B	0
	C	-18
Q502 (2N404)	E	-7.2
	B	-7
	C	-18
Q503 (2N520A)	E	-7.2
	B	-7.5
	C	-8.9
Q504 (2N169A)	E	-8.9
	B	-8.7
	C	-8.7
Q505 (2M169A)	E	-17
	B	-16.5
	C	0
Q506 (2N404)	E	-5.8
	B	-5
	C	-16.5
Q507 (2N404)	E	-5.8
	B	-6.2
	C	-6
Q508 (2N1374)	E	-8.9
	B	-9
	C	-18
Q509 (2N1374)	E	-8.7
	B	-8.9
	C	-18
Q601 (2N1374)	E	-1.6
	B	-1.5
	C	-18
Q602 (2N1374)	E	-1.2
	B	-1.6
	C	-8.4
Q603 (2N1374)	E	-8.2
	B	-8.4
	C	-18
Q701 (2N404)	E	-7.2
	B	-6.9
	C	-18
Q702 (2N520A)	E	-7.2
	B	-7.4
	C	-8.7
Q703 (2N404)	E	-5.8
	B	-5
	C	-16.5
Q704 (2N404)	E	-5.8
	B	-6.2
	C	-6
Q705 (2N1374)	E	-9
	B	-9.2
	C	-18
Q706 (2N1374)	E	-8.8
	B	-9
	C	-18
Q801 (2N169A)	E	-8.6
	B	-8.4
	C	-5.4
Q802 (2N169A)	E	-8.6
	B	-8.4
	C	-5.4
Q803 (2N1374)	E	-5.2
	B	-5.4
	C	-13.9
Q804 (2N1374)	E	-5.2
	B	-5.4
	C	-12.4
Q805 (2N1374)	E	-2.7
	B	-2.9
	C	-5.2
Q806 (2N1218)	E	-20 to -30*
	B	-19.5 to -29.5*
	C	-18
Q901 (2N582)	E	-4.4
	B	-4.6
	C	-17
Q902 (2N582)	E	-10.7
	B	-10.9
	C	-11
Q903 (2N582)	E	-10.7
	B	-8.1
	C	-18

NOTES:
conditions of measurement:
1. Power input 115V, 60 c/s.
2. No input signal.
3. All voltages measured with VTVM.

* Depending on line voltage.

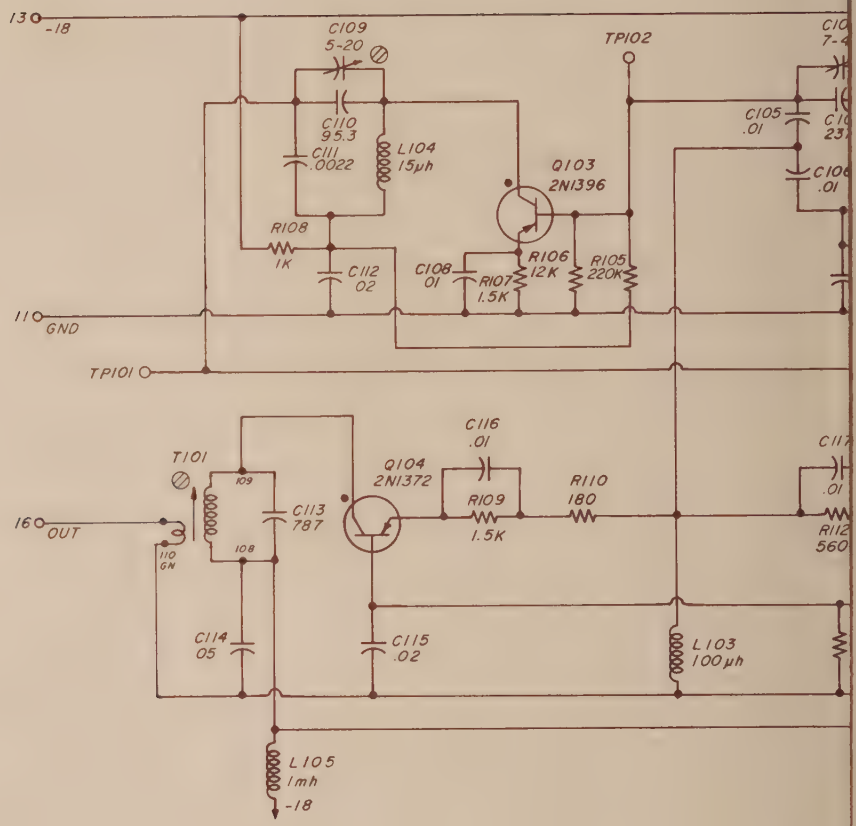
Do not attempt to measure resistances at these transistors.

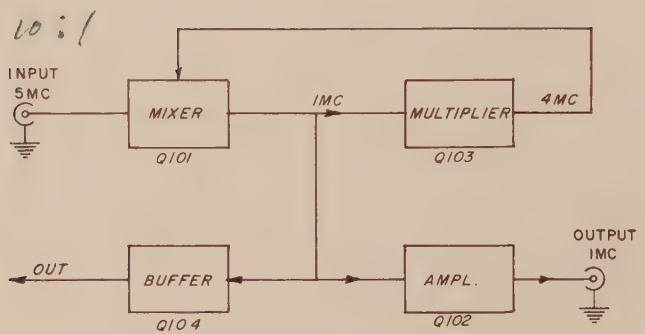
PARTS LIST
TYPE 1114-P1 1-MC PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R101	Composition, 2.2kΩ ±5% 1/2w	6100-2225
R102	Composition, 12kΩ ±5% 1/2w	6100-3125
R103	Composition, 470kΩ ±5% 1/2w	6100-4475
R104	Composition, 470Ω ±5% 1/2w	6100-1475
R105	Composition, 220kΩ ±5% 1/2w	6100-4225
R106	Composition, 12kΩ ±5%1/2w	6100-3125
R107	Composition, 1.5kΩ ±5% 1/2w	6100-2155
R108	Composition, 1kΩ ±5% 1/2w	6100-2105
R109	Composition, 1.5kΩ ±5% 1/2w	6100-2155
R110	Composition, 180Ω ±5% 1/2w	6100-1185
R111	Composition, 1.2kΩ ±5% 1/2w	6100-2125
R112	Composition, 560Ω ±5% 1/2w	6100-1565
R113	Composition, 6.2kΩ ±5% 1/2w	6100-2625
R114	Composition, 36kΩ ±5% 1/2w	6100-3365
	CAPACITORS	
C101	Ceramic, 0.01μf ±20% 500dcwv	4406-3109
C102	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C103	Trimmer, 7-45pf	4910-0100
C104	Mica, 237pf ±2% 500dcwv	4590-0520
C105	Mica, 0.01μf ±5% 500dcwv	4540-0105
C106	Mica, 0.01μf ±5% 500dcwv	4540-0105
C107	Ceramic, 0.0047μf ±20% 500dcwv	4406-2479
C108	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C109	Trimmer, 5-20pf	4910-0400
C110	Mica, 95.3pf ±2% 500dcwv	4590-0390
C111	Mica, 0.0022μf ±5% 500dcwv	4580-0500

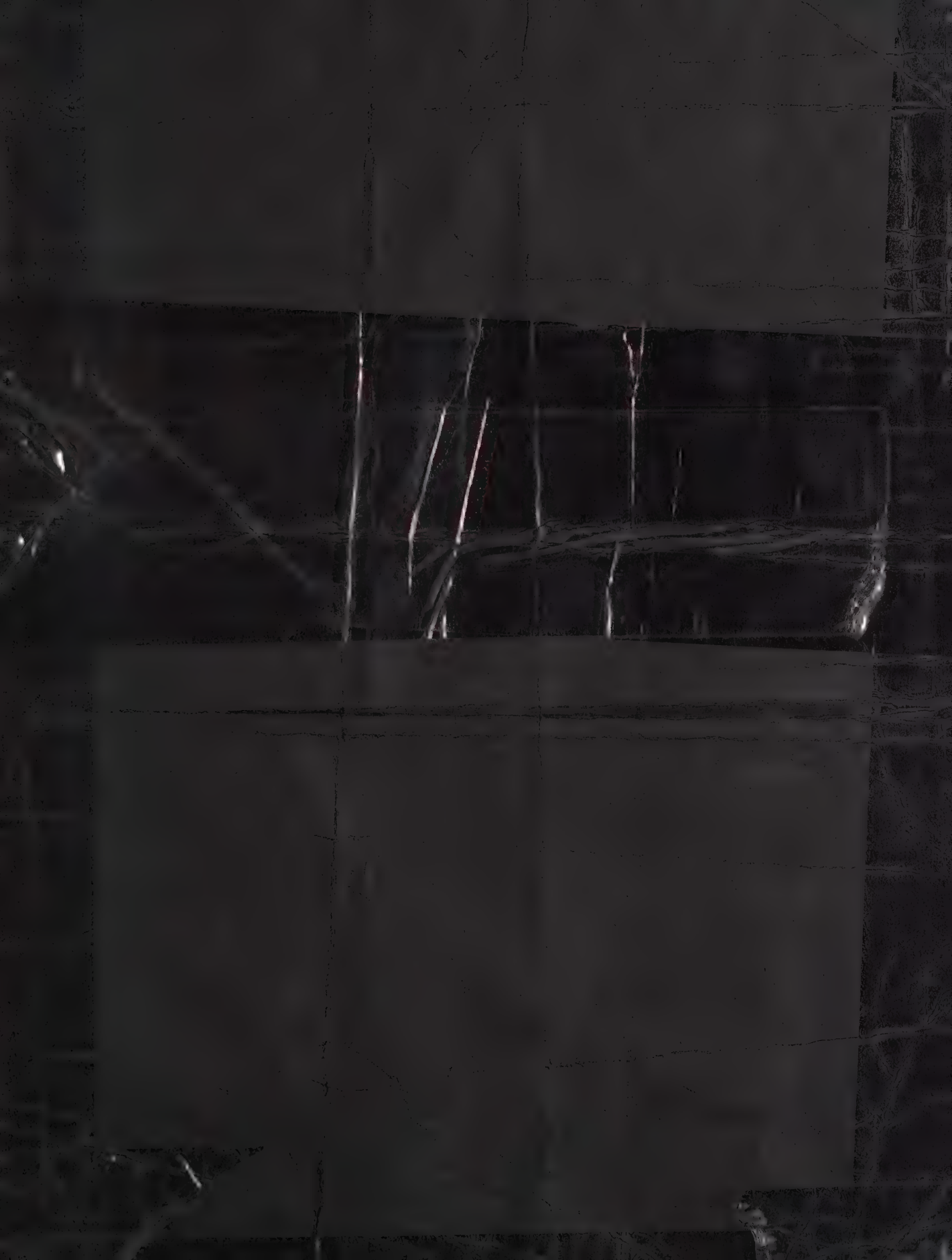
REF NO.	CAPACITORS	PART NO.
C112	Ceramic, 0.02μf +80-20% 50dcwv	4402-3200
C113	Mica, 787pf ±2% 500dcwv	4590-0570
C114	Ceramic, 0.05μf +80-20% 50dcwv	4403-3500
C115	Ceramic, 0.02μf +80-20% 50dcwv	4402-3200
C116	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C117	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C118	Ceramic, 0.02μf +80-20% 50dcwv	4402-3200
C119	Mica, 787pf ±2% 500dcwv	4590-0570
C120	Ceramic, 0.05μf +80-20% 50dcwv	4403-3500
C121	Ceramic, 180pf ±5% 500dcwv	4404-1185
	MISCELLANEOUS	
J101	CONNECTOR, Coaxial Type 874	0874-4501
J102	CONNECTOR, Coaxial Type 874	0874-4501
L101	CHOKE, Metal 33μh	4300-2900
L102	INDUCTOR, 100μh	1114-0401
L103	INDUCTOR, 100μh	1114-0401
L104	CHOKE, Metal 15μh	4300-2400
L105	CHOKE, Metal 1mh	4300-5000
Q101	TRANSISTOR, Type 2N1396	8210-1396
Q102	TRANSISTOR, Type 2N1372	8210-1372
Q103	TRANSISTOR, Type 2N1396	8210-1396
Q104	TRANSISTOR, Type 2N1372	8210-1372
T101	TRANSFORMER	1114-2010
T102	TRANSFORMER	1114-2010

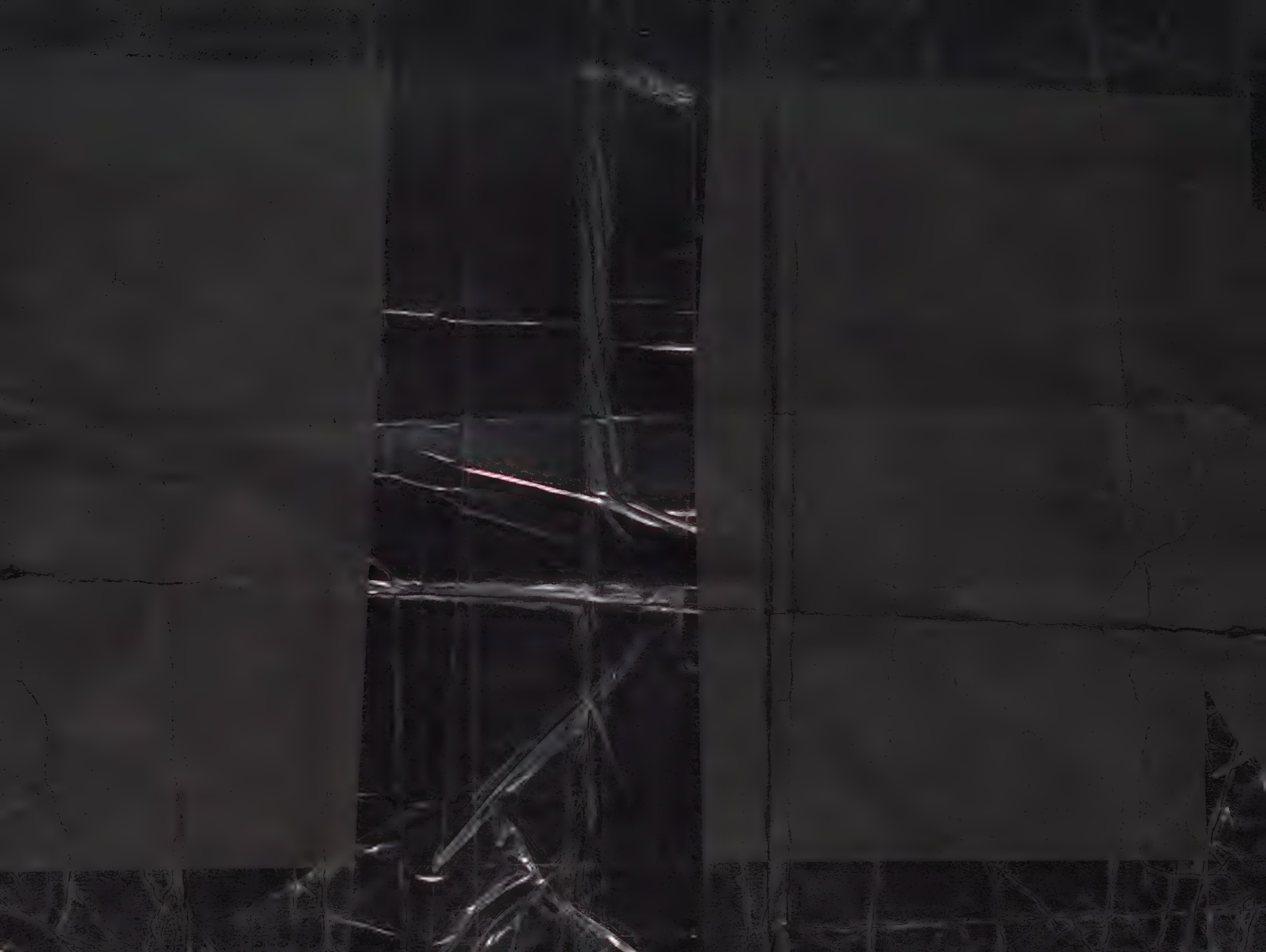
Etched Board Layout, Type 1114-P1 1-Mc Plug-In Unit.



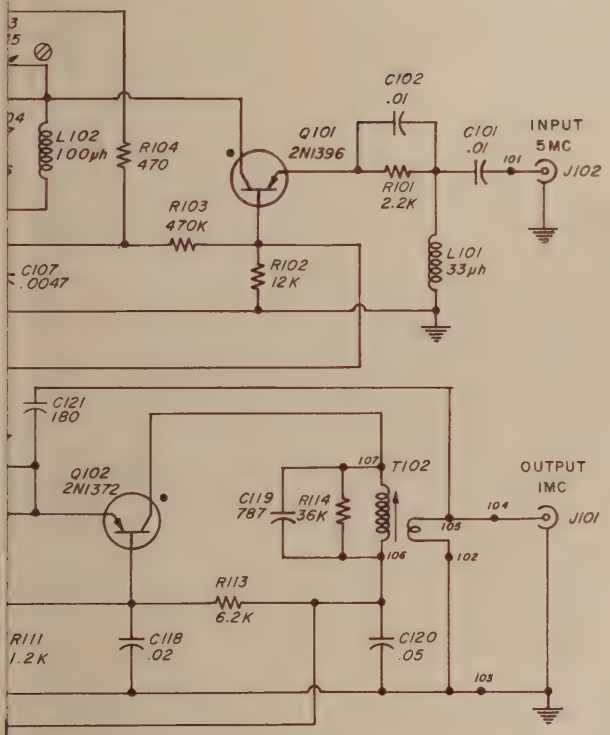


Block Diagram





Schematic Diagram, Type 1114-P1 1-Mc Plug-In Unit.



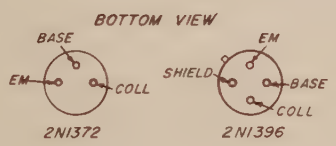
NOTES:

RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K=1000 M=1 MEGOHM

CAPACITANCE VALUES ONE & OVER IN MICROMICROFARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

⊘ SCREWDRIVER CONTROL

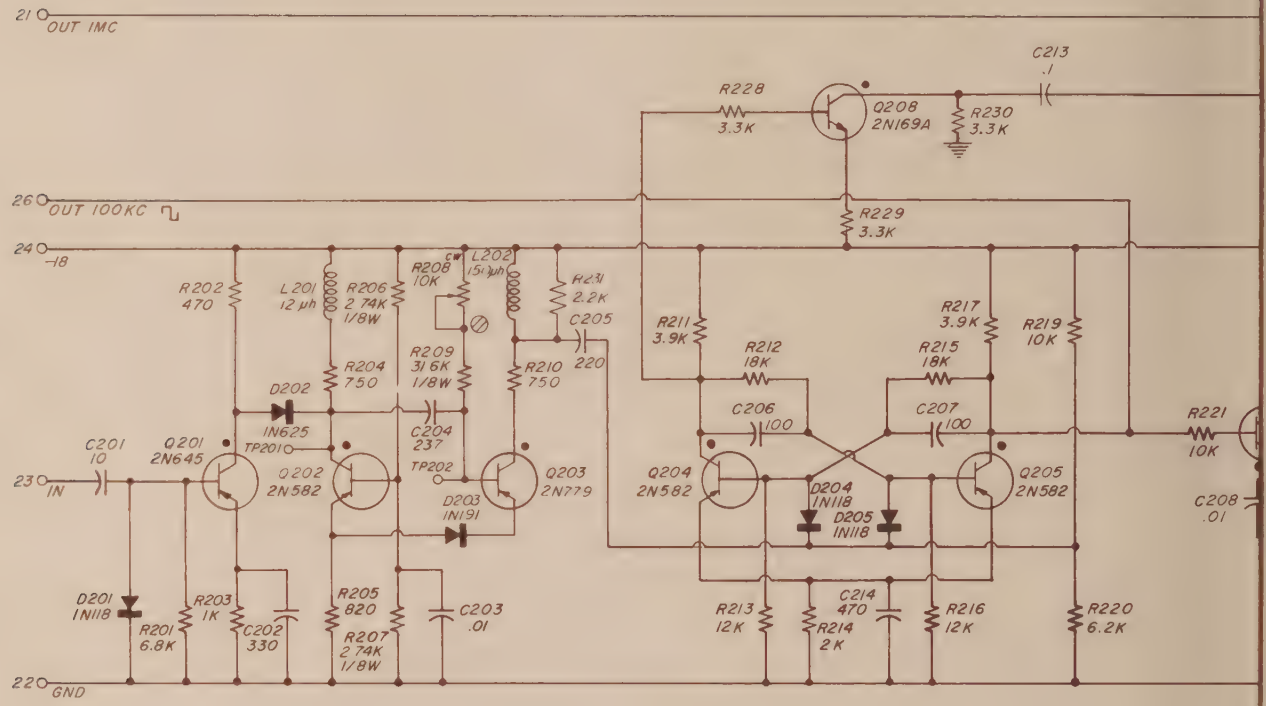


Etched Board Layout, Type 1114-P2 100-KC Plug-In Unit.

PARTS LIST
TYPE 1114-P2 100-KC PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R201	Composition, 6.8kΩ ±5% 1/2w	6100-2685
R202	Composition, 470Ω ±5% 1/2w	6100-1475
R203	Composition, 1kΩ ±5% 1/2w	6100-2105
R204	Composition, 750Ω ±5% 1/2w	6100-1755
R205	Composition, 820Ω ±5% 1/2w	6100-1825
R206	Film, 2.74kΩ ±1% 1/8w	6250-1274
R207	Film, 2.74kΩ ±1% 1/8w	6250-1274
R208	Potentiometer, Composition, 10kΩ ±20%	6040-0700
R209	Film, 31.6kΩ ±1% 1/8w	6250-2316
R210	Composition, 820Ω ±5% 1/2w	6100-1755
R211	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R212	Composition, 18kΩ ±5% 1/2w	6100-3185
R213	Composition, 12kΩ ±5% 1/2w	6100-3125
R214	Composition, 2kΩ ±5% 1/2w	6100-2205
R215	Composition, 18kΩ ±5% 1/2w	6100-3185
R216	Composition, 12kΩ ±5% 1/2w	6100-3125
R217	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R219	Composition, 10kΩ ±5% 1/2w	6100-3105
R220	Composition, 6.2kΩ ±5% 1/2w	6100-2625
R221	Composition, 10kΩ ±5% 1/2w	6100-3105
R222	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R223	Composition, 56Ω ±5% 1/2w	6100-0565
R224	Composition, 820Ω ±5% 1/2w	6100-1825
R225	Composition, 2.4kΩ ±5% 1/2w	6100-2245
R226	Composition, 13kΩ ±5% 1/2w	6100-3135
R227	Composition, 150Ω ±5% 1/2w	6100-1155
R228	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R229	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R230	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R231	Composition, 2.2kΩ ±5% 1/2w	6100-2225
	CAPACITORS	
C201	Ceramic, 100pf ±10%NM 500dcwv	4400-2999
C202	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C203	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100

REF NO.	CAPACITORS	PART NO.
C204	Mica, 383pf ±2% 500dcwv	4590-0520
C205	Ceramic, 220pf ±10%NM 500dcwv	4400-4655
C206	Ceramic, 100pf ±10%NM 500dcwv	4400-4600
C207	Ceramic, 100pf ±10%NM 500dcwv	4400-4600
C208	Mica, 0.01μf ±1% 500dcwv	4560-0300
C209	Ceramic, 0.1μf +80-20% 50dcwv	4403-4100
C210	Ceramic, 0.1μf +80-20% 50dcwv	4403-4100
C211	Ceramic, 0.1μf +80-20% 50dcwv	4403-4100
C212	Mica, 0.01μf ±1% 500dcwv	4560-0300
C213	Ceramic, 0.1μf +80-20% 50dcwv	4403-4100
C214	Ceramic, 470pf ±20% 500dcwv	4404-1479
	MISCELLANEOUS	
D201	DIODE, Type 1N118A	6082-1006
D202	DIODE, Type 1N625	6082-1012
D203	DIODE, Type 1N191	6082-1008
D204	DIODE, Type 1N118A	6082-1006
D205	DIODE, Type 1N118A	6082-1006
J201	CONNECTOR, Coaxial Type 874	0874-4501
J202	CONNECTOR, Coaxial Type 874	0874-4501
J203	CONNECTOR, Coaxial Type 874	0874-4501
L201	CHOKE, Metal 12μh ±10%	4300-2300
L202	CHOKE, Metal 150μh ±10%	4300-3810
L203	INDUCTOR, 250μh	1114-2200
Q201	TRANSISTOR, Type 2N645	8210-6450
Q202	TRANSISTOR, Type 2N582	8210-5820
Q203	TRANSISTOR, Type 2N582	8210-7791
Q204	TRANSISTOR, Type 2N582	8210-5820
Q205	TRANSISTOR, Type 2N582	8210-5820
Q206	TRANSISTOR, Type 2N169A	8210-1692
Q207	TRANSISTOR, Type 2N1372	8210-1372
Q208	TRANSISTOR, Type 2N169A	8210-1692
T201	TRANSFORMER	1114-2220



NOTES

RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

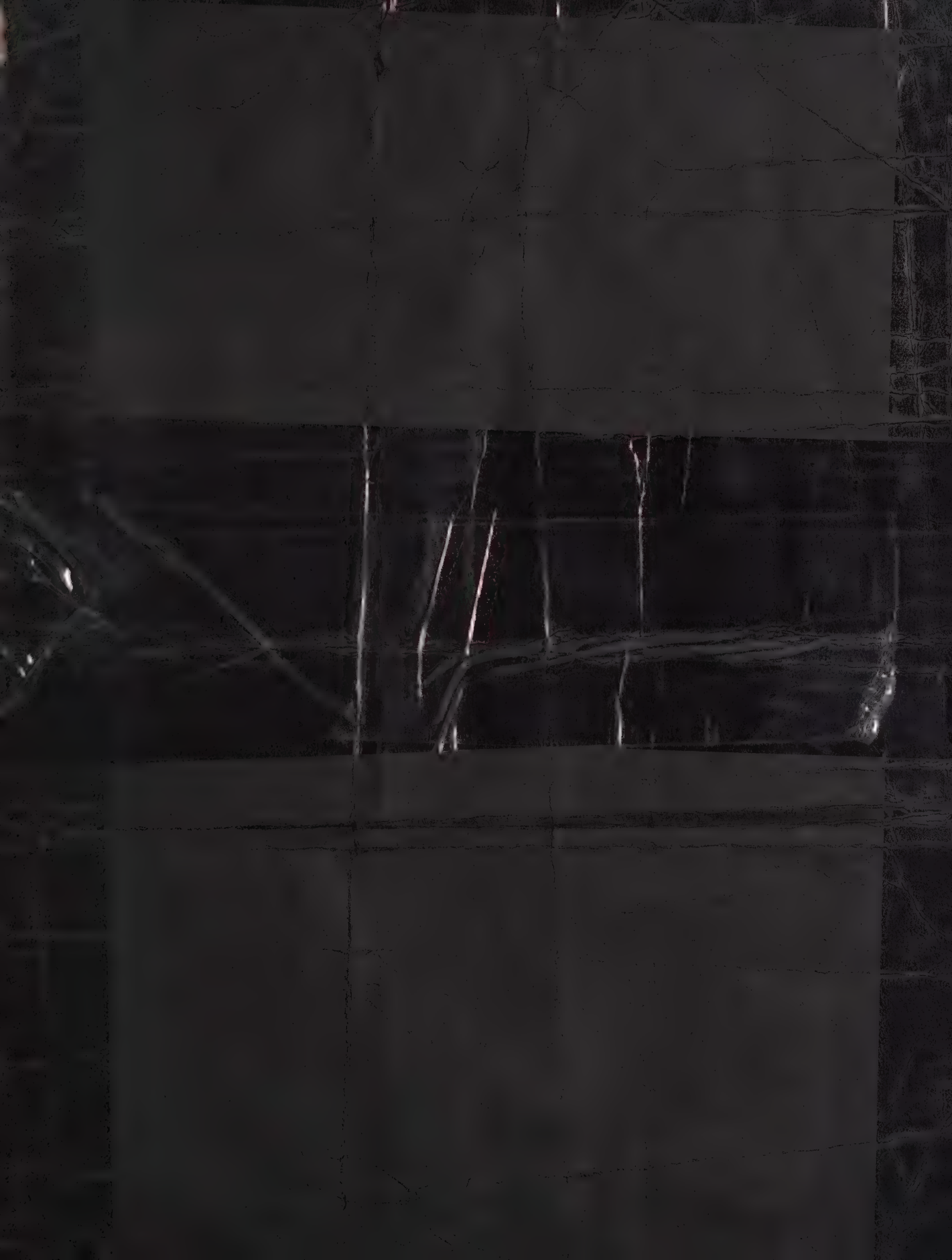
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED

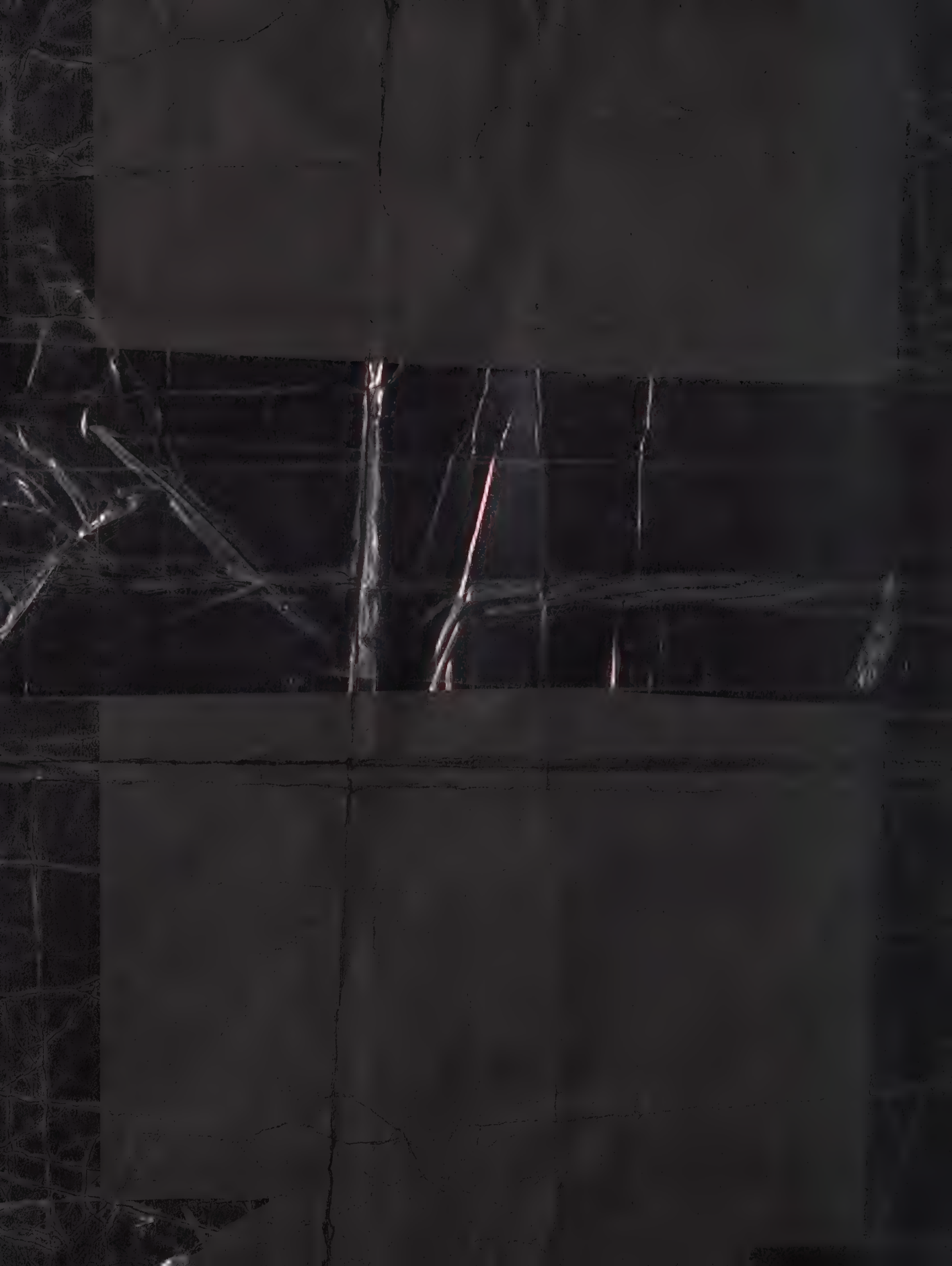
K = 1000 OHMS M = 1 MEGOHM

CAPACITANCE VALUES ONE & OVER IN MICRO-MICRO-FARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED

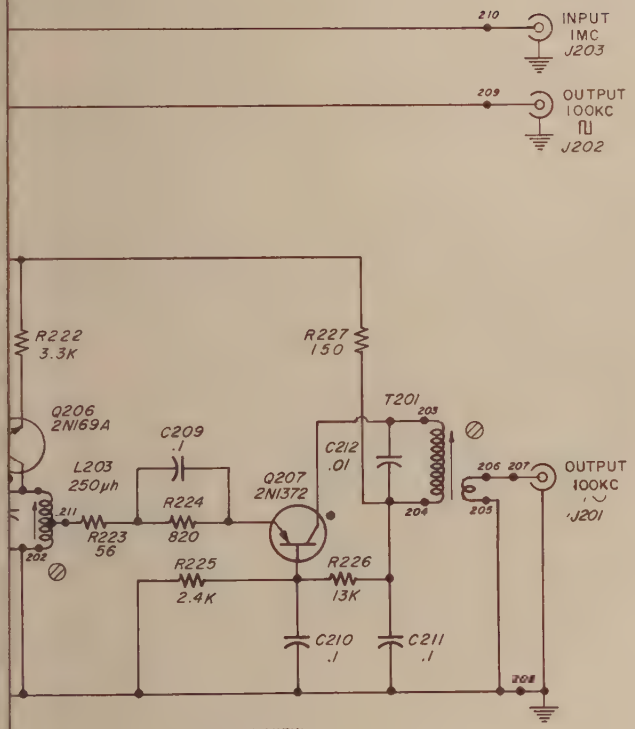
⊘ SCREWDRIVER CONTROL

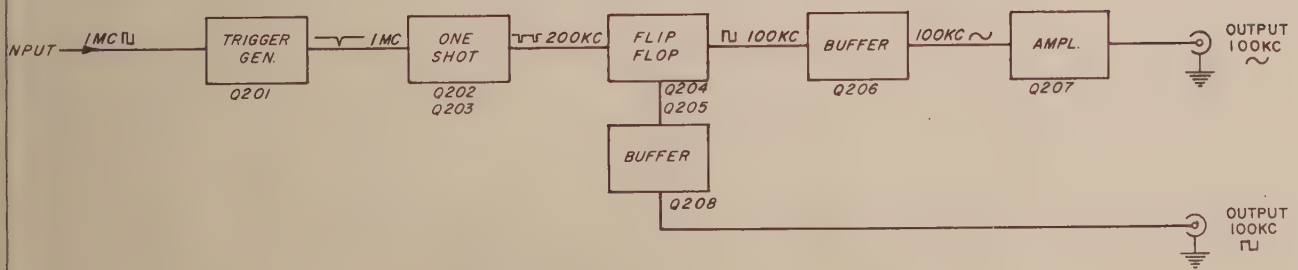
Block Diagram





Schematic Diagram, Type 1114-P2 100-KC Plug-In Unit.



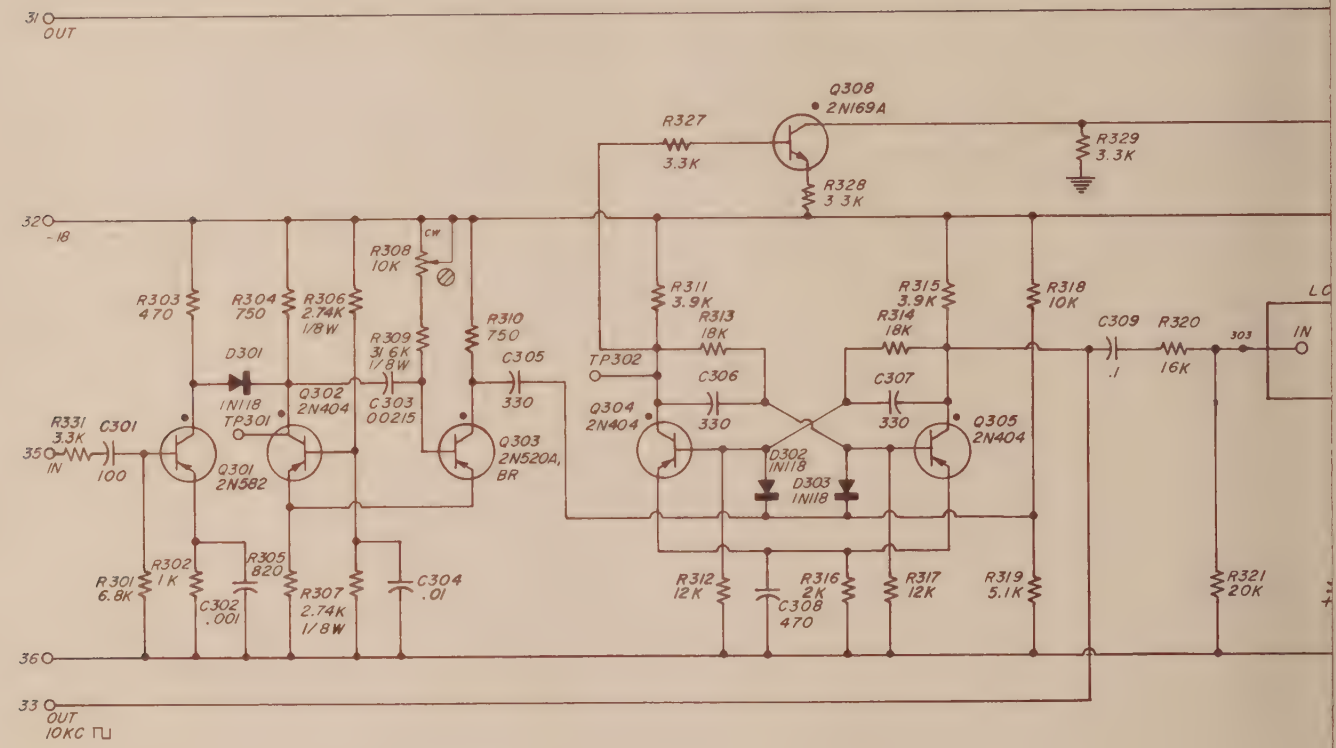


Etched Board Layout, Type 1114-P3 10-KC Plug-In Unit.

PARTS LIST
TYPE 1114-P3 10-KC PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R301	Composition, 6.8kΩ ±5% 1/2w	6100-2685
R302	Composition, 1kΩ ±5% 1/2w	6100-2105
R303	Composition, 470Ω ±5% 1/2w	6100-1475
R304	Composition, 750Ω ±5% 1/2w	6100-1755
R305	Composition, 820Ω ±5% 1/2w	6100-1825
R306	Film, 2.74kΩ ±1% 1/8w	6250-1274
R307	Film, 2.74kΩ ±1% 1/8w	6250-1274
R308	Potentiometer, Composition, 10kΩ ±20%	6040-0700
R309	Film, 31.6kΩ ±1% 1/8w	6250-2316
R310	Composition, 750Ω ±5% 1/2w	6100-1755
R311	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R312	Composition, 12kΩ ±5% 1/2w	6100-3125
R313	Composition, 18kΩ ±5% 1/2w	6100-3185
R314	Composition, 18kΩ ±5% 1/2w	6100-3185
R315	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R316	Composition, 2kΩ ±5% 1/2w	6100-2205
R317	Composition, 12kΩ ±5% 1/2w	6100-3125
R318	Composition, 10kΩ ±5% 1/2w	6100-3105
R319	Composition, 5.1kΩ ±5% 1/2w	6100-2515
R320	Composition, 16kΩ ±5% 1/2w	6100-3165
R321	Composition, 20kΩ ±5% 1/2w	6100-3205
R322	Composition, 10kΩ ±5% 1/2w	6100-3105
R323	Composition, 10kΩ ±5% 1/2w	6100-3105
R324	Composition, 620Ω ±5% 1/2w	6100-1625
R325	Composition, 620Ω ±5% 1/2w	6100-1625
R326	Composition, 33kΩ ±5% 1/2w	6100-3335
R327	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R328	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R329	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R330	Composition, 15kΩ ±5% 1/2w	6100-3155
R331	Composition, 3.3kΩ ±5% 1/2w	6100-2335

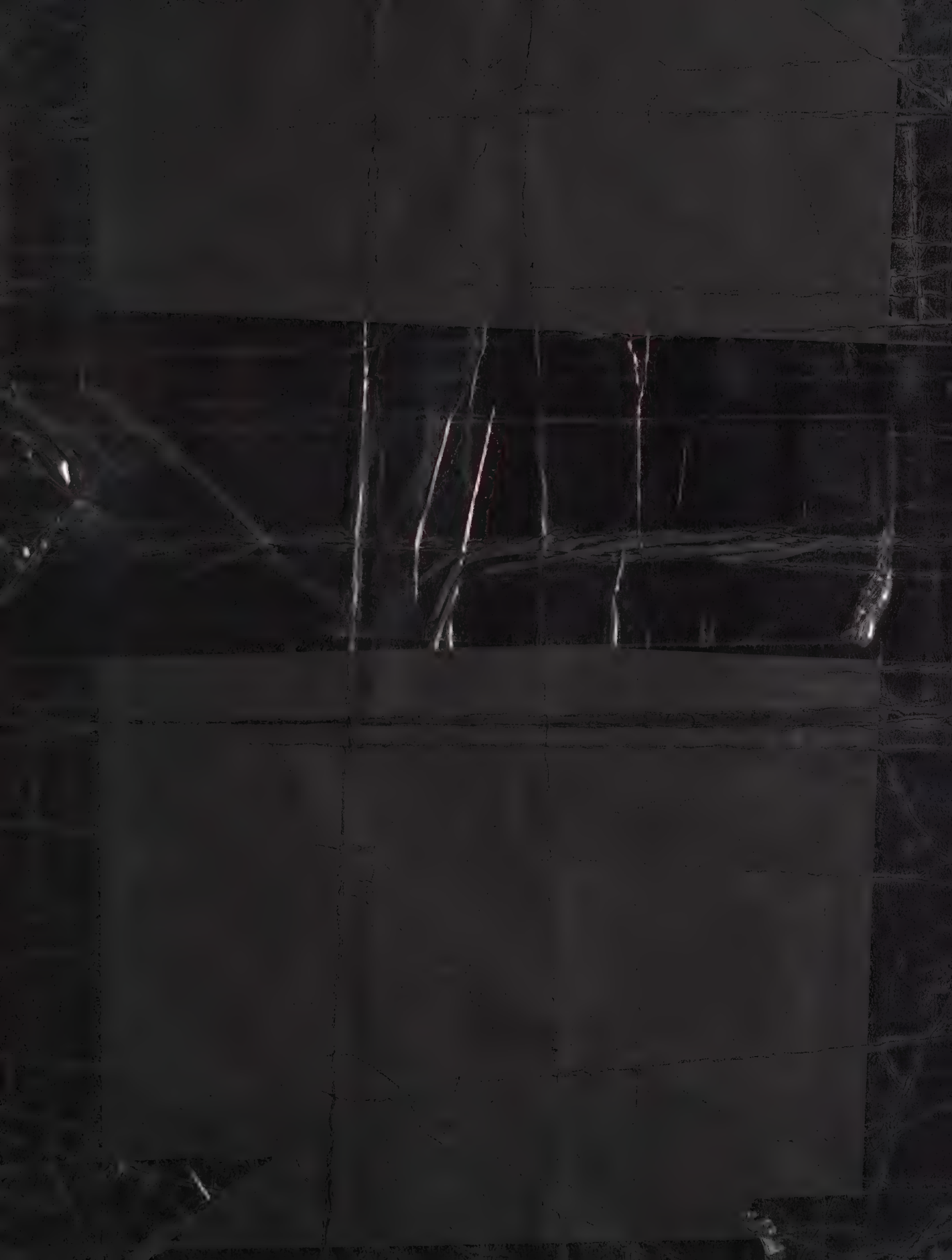
REF NO.	CAPACITORS	PART NO.
C301	Ceramic, 100pf ±10%NM 500dcwv	4400-4600
C302	Mica, 0.001μf ±10% 500dcwv	4570-1200
C303	Mica, 0.00215μf ±2% 500dcwv	4590-0850
C304	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C305	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C306	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C307	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C308	Ceramic, 470pf ±20% 500dcwv	4404-1479
C309	Ceramic, 0.1μf +80-20% 50dcwv	4403-4100
C310	Electrolytic, 0.47μf ±20% 75 V	4450-4310
C311	Electrolytic, 0.47μf ±20% 75 V	4450-4310
C312	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C313	Ceramic, 0.0047μf ±20% 500dcwv	4406-2479
	MISCELLANEOUS	
D301	DIODE, Type 1N118A	6082-1006
D302	DIODE, Type 1N118A	6082-1006
D303	DIODE, Type 1N118A	6082-1006
J301	CONNECTOR, Coaxial Type 874	0874-4501
J302	CONNECTOR, Coaxial Type 874	0874-4501
J303	CONNECTOR, Coaxial Type 874	0874-4501
LC301	FILTER	1114-0413
Q301	TRANSISTOR, Type 2N582	8210-5820
Q302	TRANSISTOR, Type 2N404	8200-4040
Q303	TRANSISTOR, Type 2N520A, BR	8210-5200
Q304	TRANSISTOR, Type 2N404	8200-4040
Q305	TRANSISTOR, Type 2N404	8200-4040
Q306	TRANSISTOR, Type 2N1374	8210-1374
Q307	TRANSISTOR, Type 2N1374	8210-1374
Q308	TRANSISTOR, Type 2N169A	8210-1692

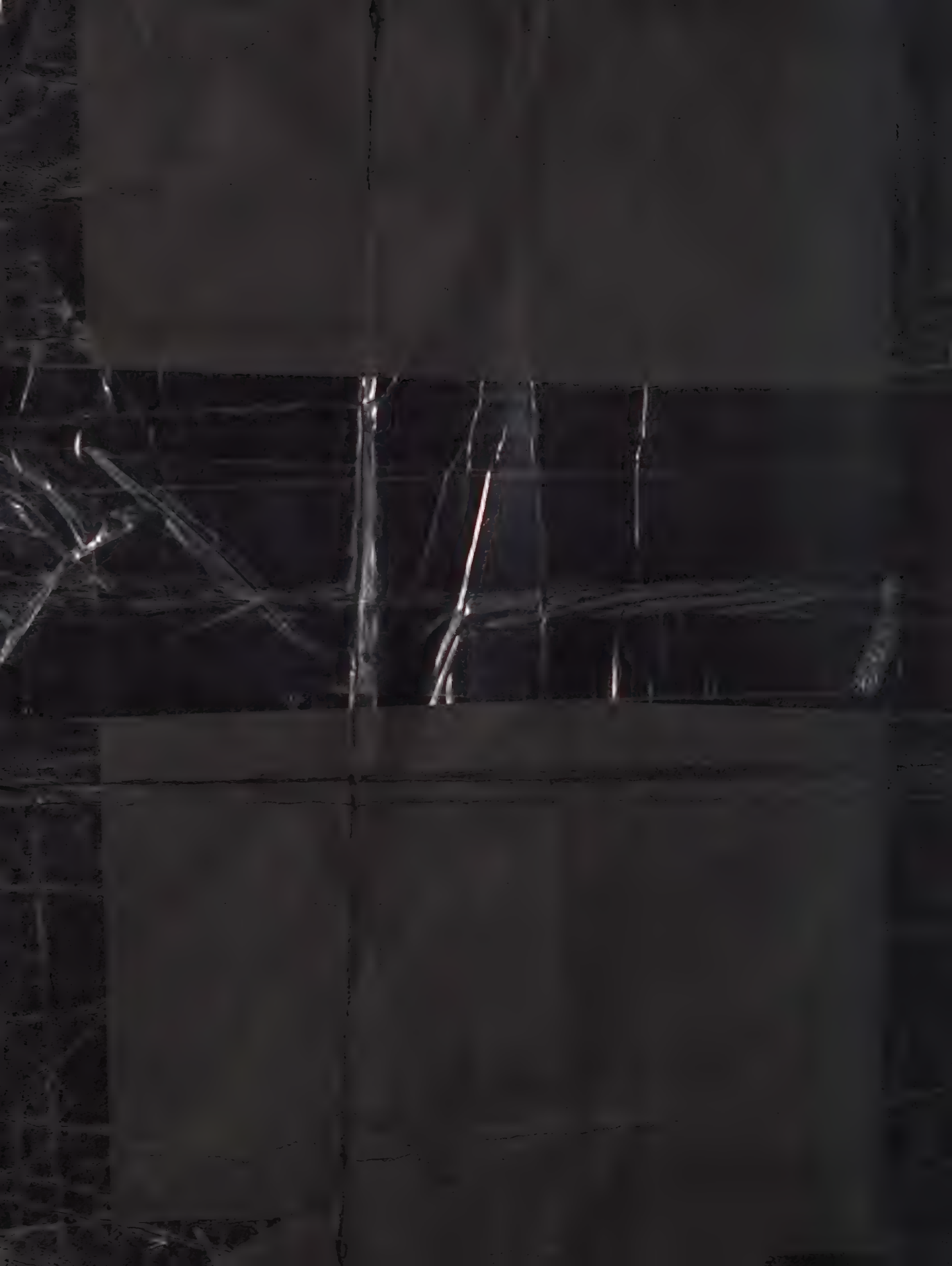


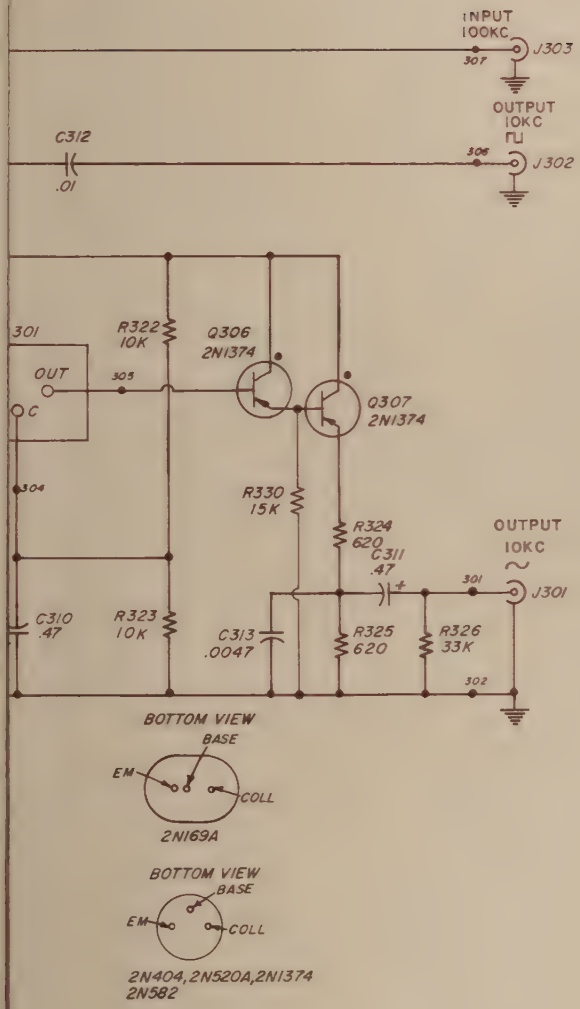
NOTES:
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K=1000 OHMS M=1 MEGOHM
CAPACITANCE VALUES ONE & OVER IN MICRO-MICROFARADS LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
⊘ SCREWDRIVER CONTROL

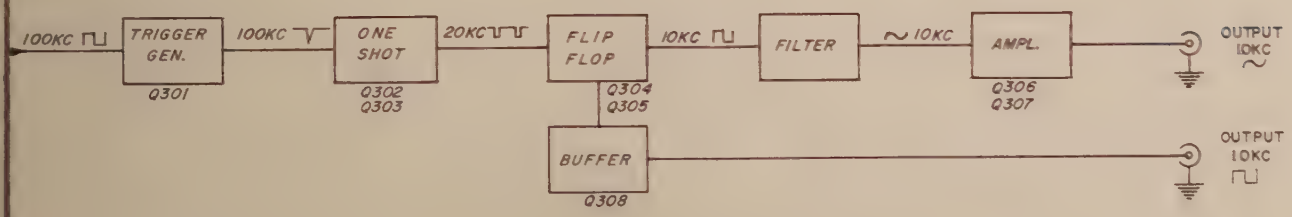
Block Diagram

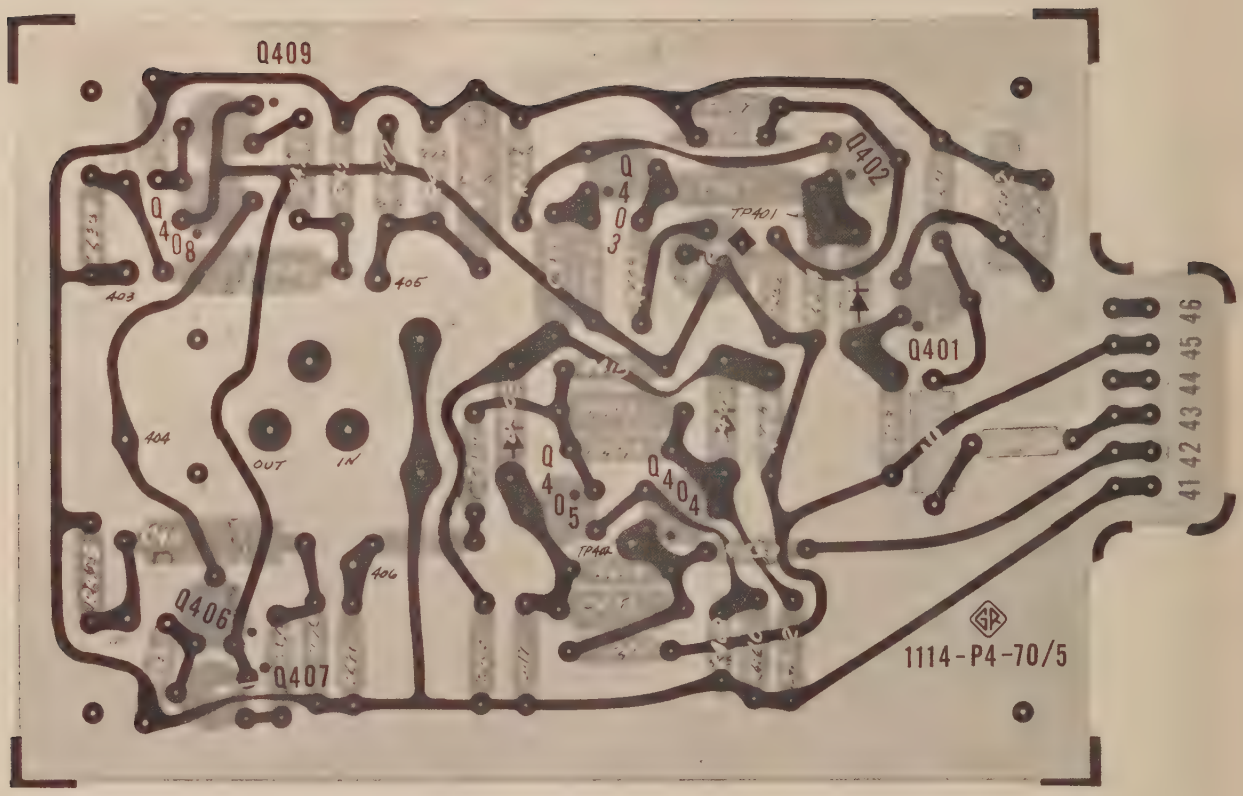
INPUT -






INPUT
100KC
307
J303
OUTPUT
10KC
C312
.01
306
J302
301
OUT
C
303
R322
10K
Q306
2N1374
Q307
2N1374
304
R330
15K
R324
620
C311
.47
OUTPUT
10KC
301
J301
C310
.47
R323
10K
C313
.0047
R325
620
R326
33K
302
BOTTOM VIEW
BASE
EM
COLL
2N169A
BOTTOM VIEW
BASE
EM
COLL
2N404, 2N520A, 2N1374
2N582


100KC
TRIGGER GEN.
Q301
100KC
ONE SHOT
Q302
Q303
20KC
FLIP FLOP
Q304
Q305
10KC
FILTER
10KC
AMPL.
Q306
Q307
OUTPUT
10KC
BUFFER
Q308
OUTPUT
10KC



Etched Board Layout, Type 1114-P4 1-KC Plug-In Unit.

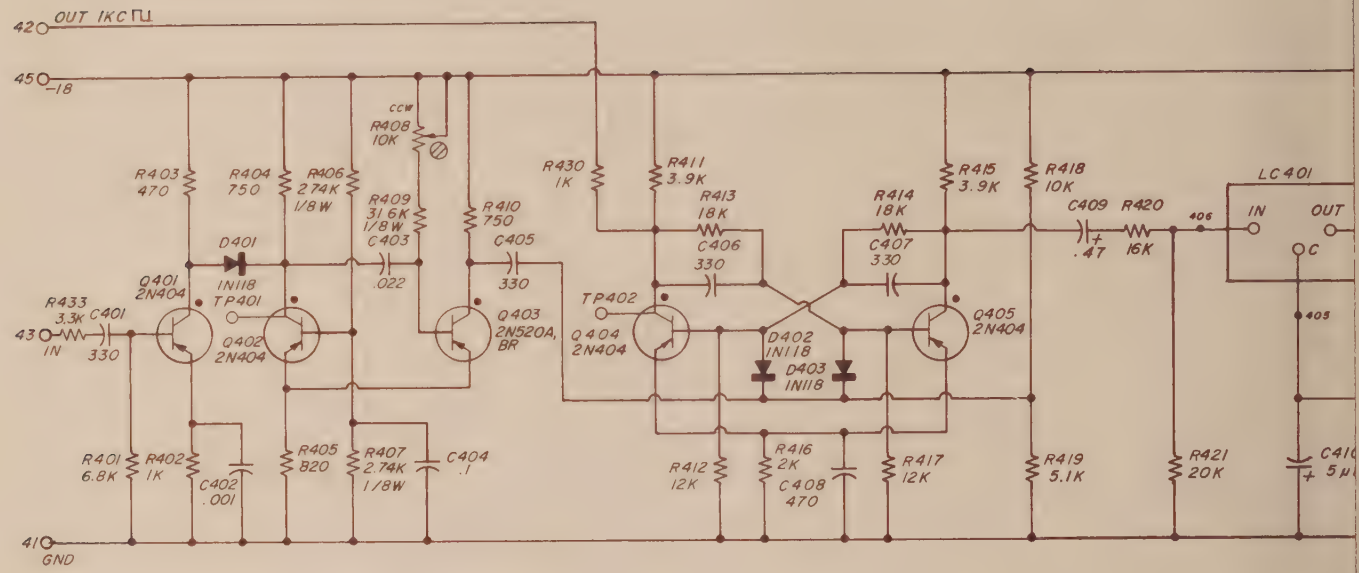
PARTS LIST
TYPE 1114-P4 1-KC PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R401	Composition, 6.8kΩ ±5% 1/2w	6100-2685
R402	Composition, 1kΩ ±5% 1/2w	6100-2105
R403	Composition, 470Ω ±5% 1/2w	6100-1475
R404	Composition, 750Ω ±5% 1/2w	6100-1755
R405	Composition, 820Ω ±5% 1/2w	6100-1825
R406	Film, 2.74kΩ ±1% 1/8w	6250-1274
R407	Film, 2.74kΩ ±1% 1/8w	6250-1274
R408	Potentiometer, Composition, 10kΩ, ±20%	6040-0700
R409	Film, 31.6kΩ ±1% 1/8w	6250-2316
R410	Composition, 750Ω ±5% 1/2w	6100-1755
R411	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R412	Composition, 12kΩ ±5% 1/2w	6100-3125
R413	Composition, 18kΩ ±5% 1/2w	6100-3185
R414	Composition, 18kΩ ±5% 1/2w	6100-3185
R415	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R416	Composition, 2kΩ ±5% 1/2w	6100-2205
R417	Composition, 12kΩ ±5% 1/2w	6100-3125
R418	Composition, 10kΩ ±5% 1/2w	6100-3105
R419	Composition, 5.1kΩ ±5% 1/2w	6100-2515
R420	Composition, 16kΩ ±5% 1/2w	6100-3165
R421	Composition, 20kΩ ±5% 1/2w	6100-3205
R422	Composition, 10kΩ ±5% 1/2w	6100-3105
R423	Composition, 10kΩ ±5% 1/2w	6100-3105
R424	Composition, 620Ω ±5% 1/2w	6100-1625
R425	Composition, 620Ω ±5% 1/2w	6100-1625
R426	Composition, 620Ω ±5% 1/2w	6100-1625
R427	Composition, 620Ω ±5% 1/2w	6100-1625
R428	Composition, 33kΩ ±5% 1/2w	6100-3335
R429	Composition, 33kΩ ±5% 1/2w	6100-3335
R430	Composition, 1kΩ ±5% 1/2w	6100-2105
R431	Composition, 15kΩ ±5% 1/2w	6100-3155
R432	Composition, 15kΩ ±5% 1/2w	6100-3155
R433	Composition, 4.3kΩ ±5% 1/2w	6100-2335

REF NO.	CAPACITORS	PART NO.
C401	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C402	Mica, 0.001μf ±10% 500dcwv	4570-1200
C403	Plastic, 0.022μf ±2% 100dcwv	4860-7858
C404	Ceramic. 0.1μf +80-20% 50dcwv	4403-4100
C405	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C406	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C407	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C408	Ceramic, 470pf ±20% 500dcwv	4404-1479
C409	Electrolytic, 0.47μf ±20% 75V	4450-4310
C410	Electrolytic, 5μf 50dcwv	4450-3900
C411	Electrolytic, 5μf 50dcwv	4450-3900
C412	Electrolytic, 5μf 50dcwv	4450-3900

MISCELLANEOUS

D401	DIODE, Type 1N118A	6082-1006
D402	DIODE, Type 1N118A	6082-1006
D403	DIODE, Type 1N118A	6082-1006
J401	CONNECTOR, Coaxial Type 874	0874-4501
J402	CONNECTOR, Coaxial Type 874	0874-4501
LC401	FILTER	1114-0414
Q401	TRANSISTOR, Type 2N404	8200-4040
Q402	TRANSISTOR, Type 2N404	8200-4040
Q403	TRANSISTOR, Type 2N520A, BR	8210-5200
Q404	TRANSISTOR, Type 2N404	8200-4040
Q405	TRANSISTOR, Type 2N404	8200-4040
Q406	TRANSISTOR, Type 2N1374	8210-1374
Q407	TRANSISTOR, Type 2N1374	8210-1374
Q408	TRANSISTOR, Type 2N1374	8210-1374
Q409	TRANSISTOR, Type 2N1374	8210-1374



NOTES:

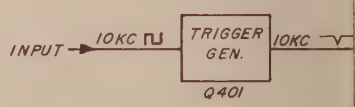
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED

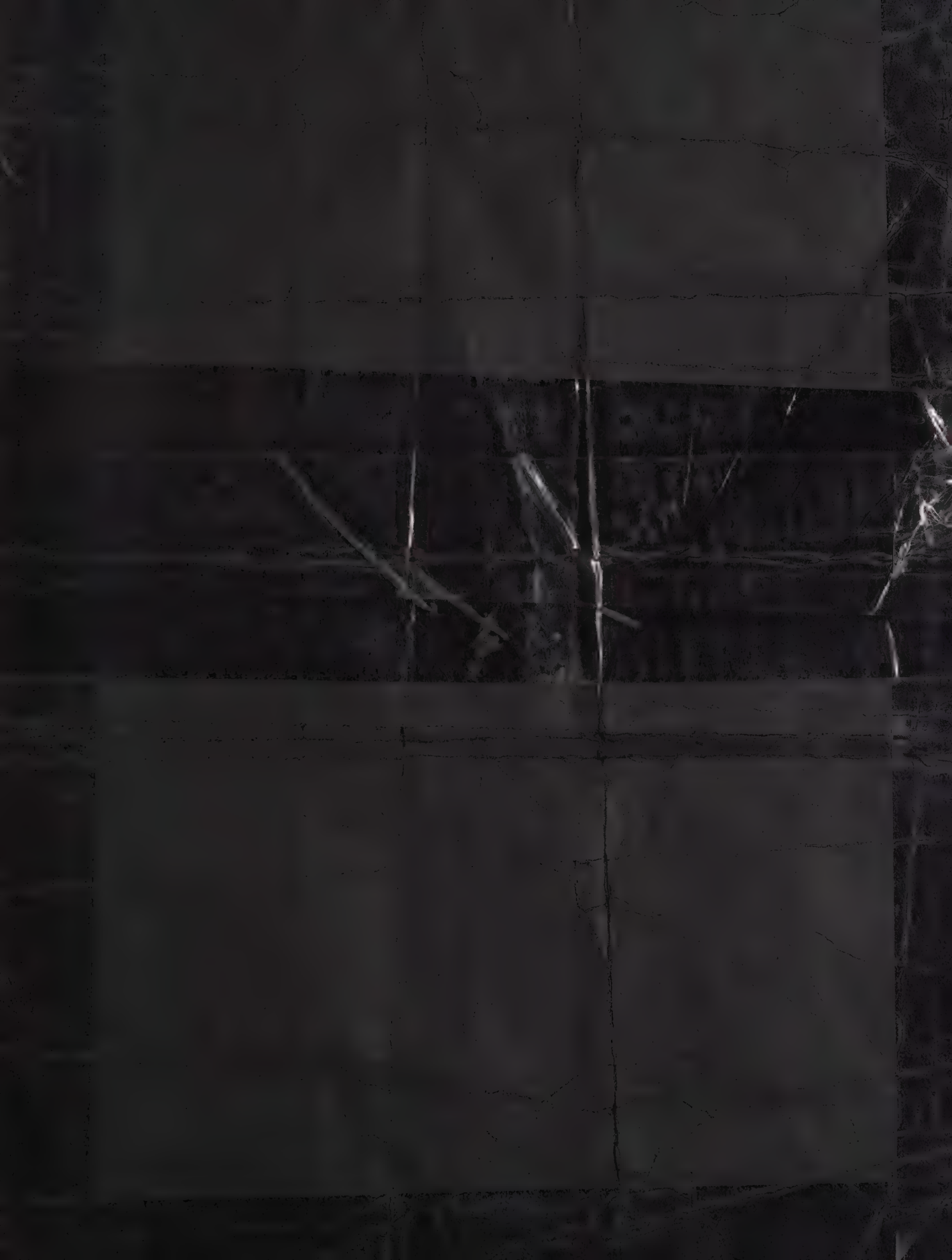
K = 1000 OHMS M = 1 MEGOHM

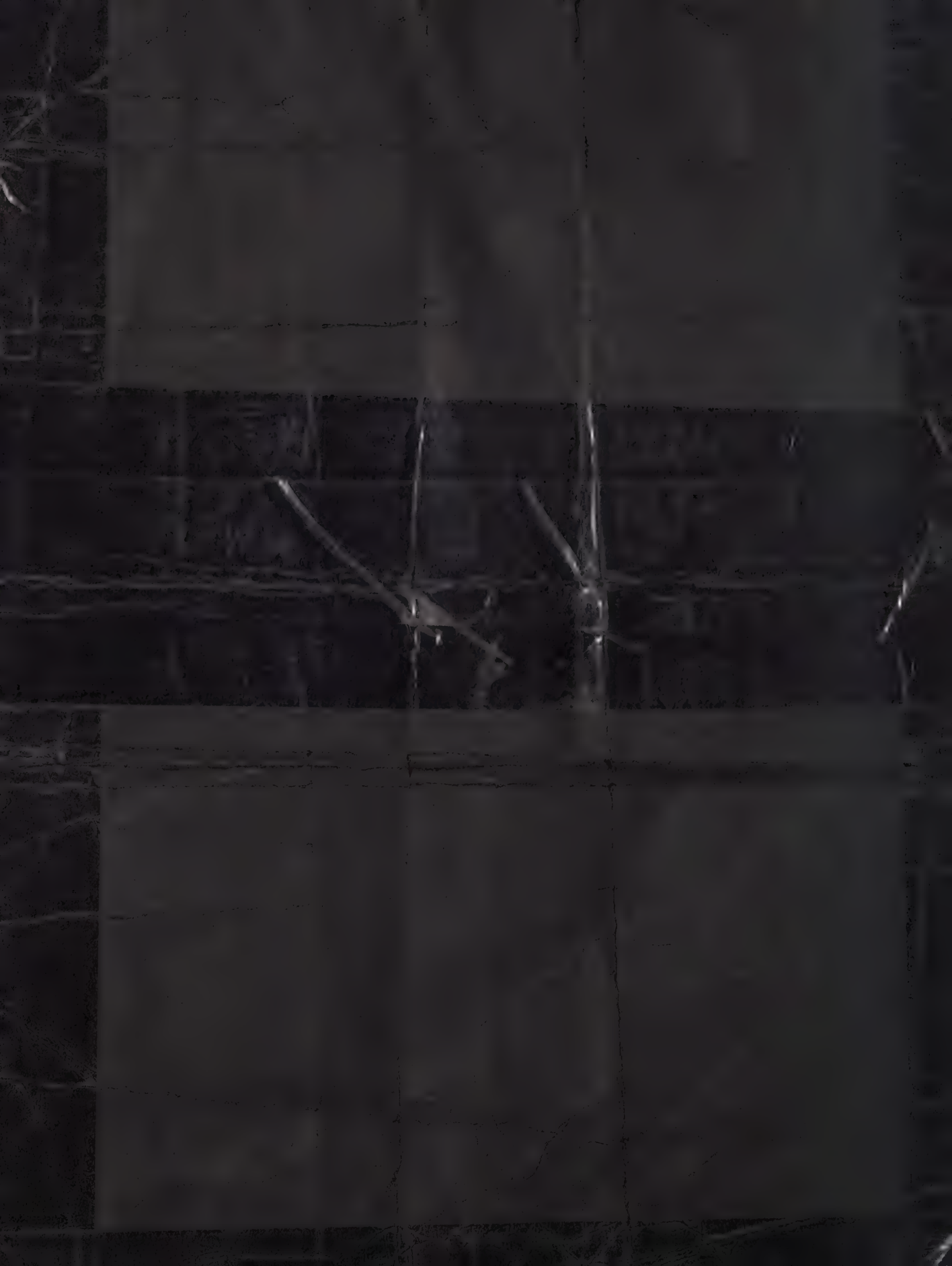
CAPACITANCE VALUES ONE & OVER IN MICRO-MICRO-FARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

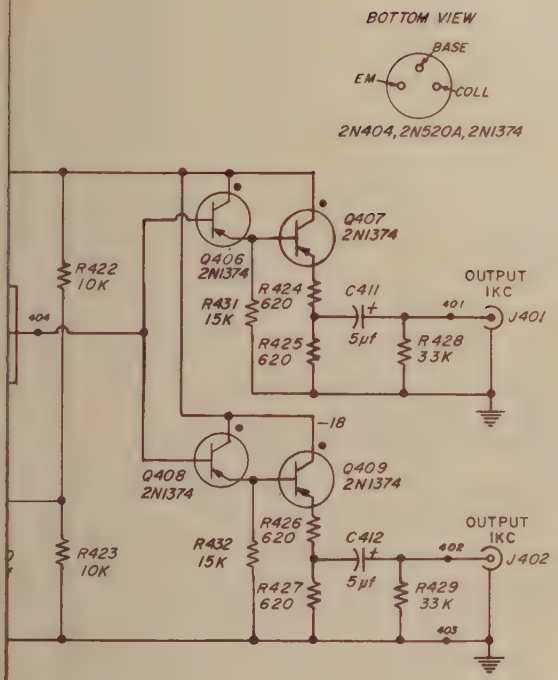
⊘ SCREWDRIVER CONTROL

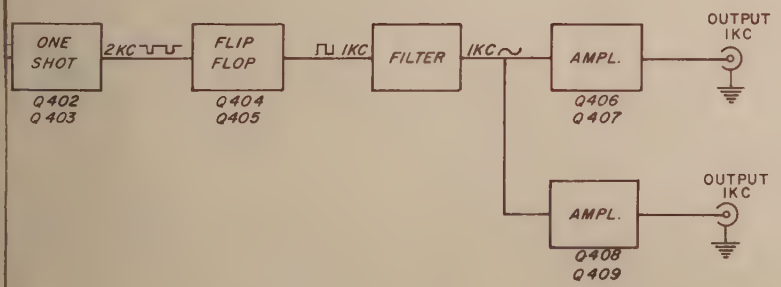


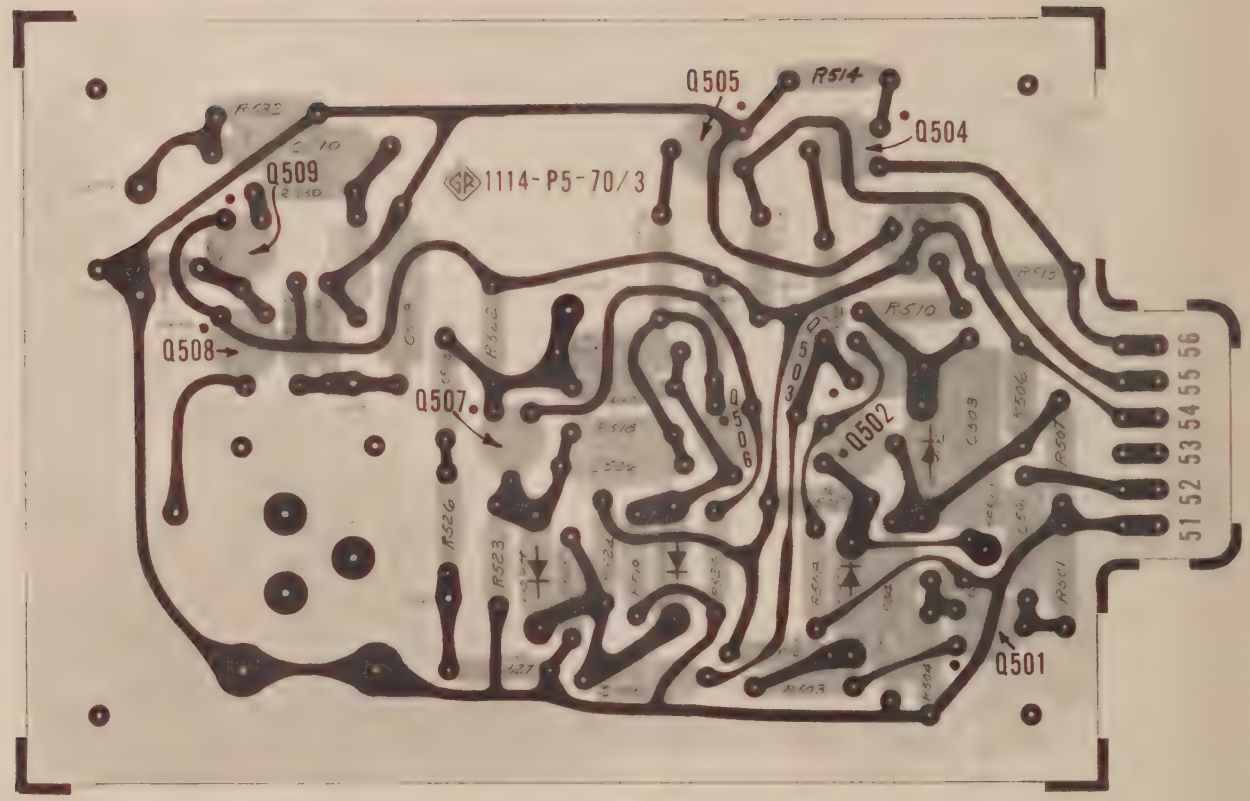
Block Diagram






BOTTOM VIEW
BASE
EM
COLL
2N404, 2N520A, 2N1374
Q407
2N1374
Q406
2N1374
R422
10K
R424
620
C411
OUTPUT
1KC
R431
15K
401
J401
404
5μf
R425
620
R428
33K
-18
Q408
2N1374
Q409
2N1374
R426
620
C412
OUTPUT
1KC
R423
10K
R432
15K
402
J402
5μf
R427
620
R429
33K
403


ONE
SHOT
2KC
FLIP
FLOP
1KC
FILTER
1KC
AMPL.
OUTPUT
1KC
Q402
Q403
Q404
Q405
Q406
Q407
AMPL.
OUTPUT
1KC
Q408
Q409



Etched Board Layout, Type 1114-P5 100-CPS Plug-In Unit.

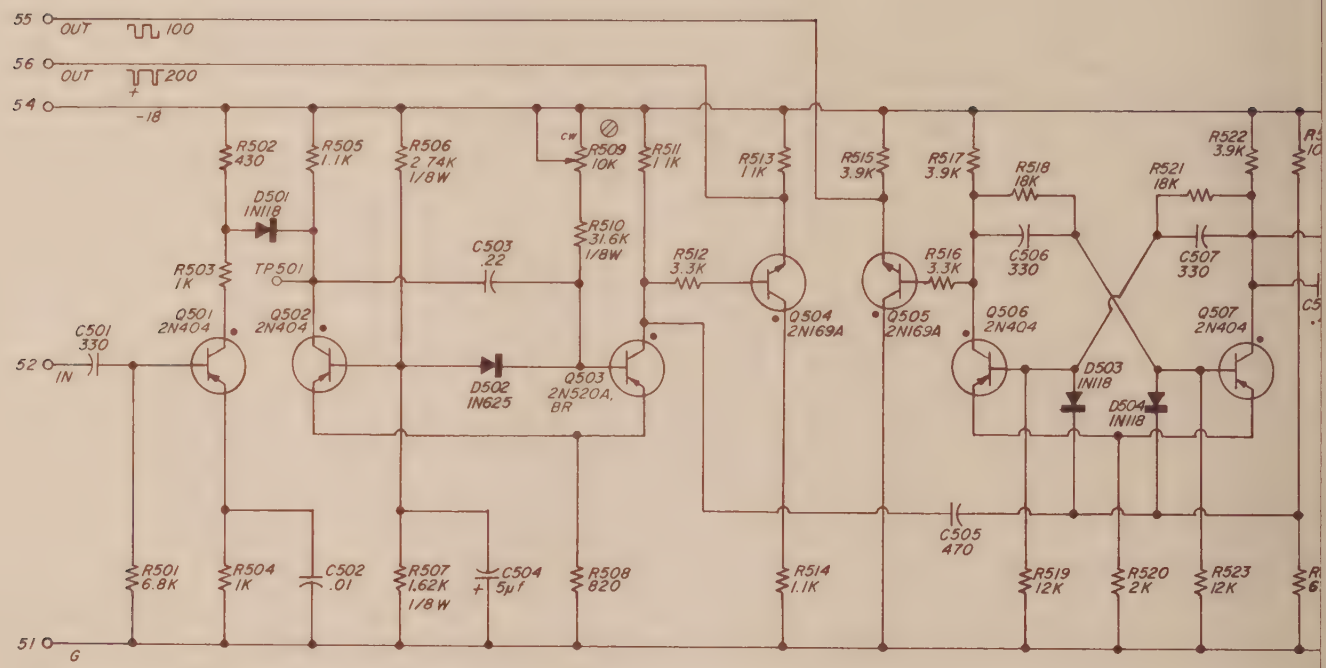
PARTS LIST
TYPE 1114-P5 100-CPS PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R501	Composition, 6.8kΩ ±5% 1/2w	6100-2685
R502	Composition, 430Ω ±5% 1/2w	6100-1435
R503	Composition, 1kΩ ±5% 1/2w	6100-2105
R504	Composition, 1kΩ ±5% 1/2w	6100-2105
R505	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R506	Film, 2.74kΩ ±1% 1/8w	6250-1274
R507	Film, 1.62kΩ ±1% 1/8w	6250-1162
R508	Composition, 820Ω ±5% 1/2w	6100-1825
R509	Potentiometer, Composition, 10kΩ ±20%	6040-0700
R510	Film, 31.6kΩ ±1% 1/8w	6250-2316
R511	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R512	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R513	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R514	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R515	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R516	Composition, 3.3kΩ ±5% 1/2w	6100-2335
R517	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R518	Composition, 18kΩ ±5% 1/2w	6100-3185
R519	Composition, 12kΩ ±5% 1/2w	6100-3125
R520	Composition, 2kΩ ±5% 1/2w	6100-2205
R521	Composition, 18kΩ ±5% 1/2w	6100-3185
R522	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R523	Composition, 12kΩ ±5% 1/2w	6100-3125
R524	Composition, 10kΩ ±5% 1/2w	6100-3105
R525	Composition, 6.2kΩ ±5% 1/2w	6100-2625
R526	Composition, 16kΩ ±5% 1/2w	6100-3165
R527	Composition, 20kΩ ±5% 1/2w	6100-3205
R528	Composition, 10kΩ ±5% 1/2w	6100-3105
R529	Composition, 10kΩ ±5% 1/2w	6100-3105
R530	Composition, 620Ω ±5% 1/2w	6100-1625
R531	Composition, 620Ω ±5% 1/2w	6100-1625
R532	Composition, 33kΩ ±5% 1/2w	6100-3335
R533	Composition, 15kΩ ±5% 1/2w	6100-3155

REF NO.	CAPACITORS	PART NO.
C501	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C502	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C503	Plastic, 0.22μf ±2% 100dcwv	4860-7950
C504	Electrolytic, 5μf 50dcwv	4450-3900
C505	Ceramic, 470pf ±10% 500dcwv	4400-4775
C506	Ceramic, 330pf ±10% 500dcwv	4400-4700
C507	Ceramic, 330pf ±10% 500dcwv	4400-4700
C508	Electrolytic, 0.47μf ±20% 35dcwv	4450-4310
C509	Electrolytic, 5μf 50dcwv	4450-3900
C510	Electrolytic, 10μf 25dcwv	4450-3800

MISCELLANEOUS

D501	DIODE, Type 1N118	8200-1180
D502	DIODE, Type 1N625	8200-6250
D503	DIODE, Type 1N118	8200-1180
D504	DIODE, Type 1N118	8200-1180
J501	CONNECTOR, Coaxial Type 874	0874-4501
LC501	FILTER	1114-0415
Q501	TRANSISTOR, Type 2N404	8200-4040
Q502	TRANSISTOR, Type 2N404	8200-4040
Q503	TRANSISTOR, Type 520A, BR	8210-5200
Q504	TRANSISTOR, Type 2N169A	8210-1692
Q505	TRANSISTOR, Type 2N169A	8210-1692
Q506	TRANSISTOR, Type 2N404	8200-4040
Q507	TRANSISTOR, Type 2N404	8200-4040
Q508	TRANSISTOR, Type 2N1374	8210-1374
Q509	TRANSISTOR, Type 2N1374	8210-1374



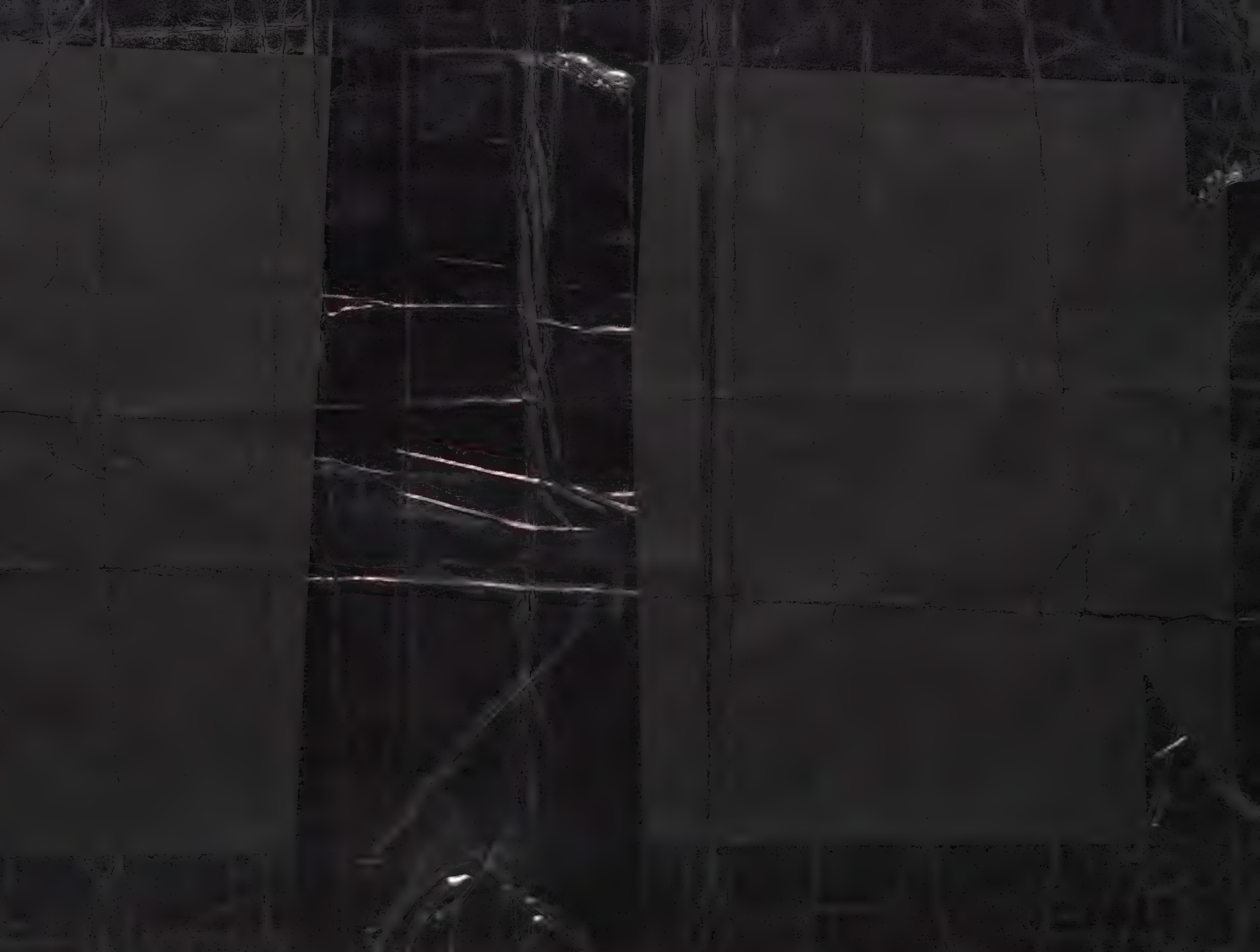
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

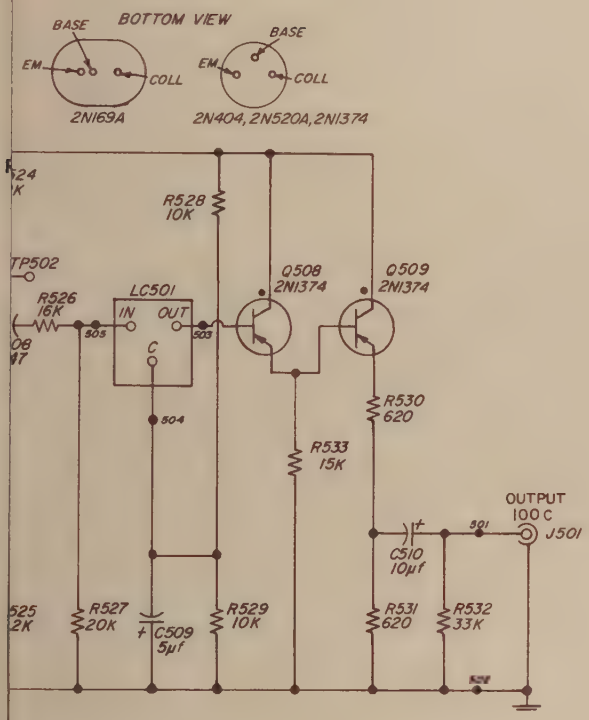
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K=1000 M=1 MEGOHM

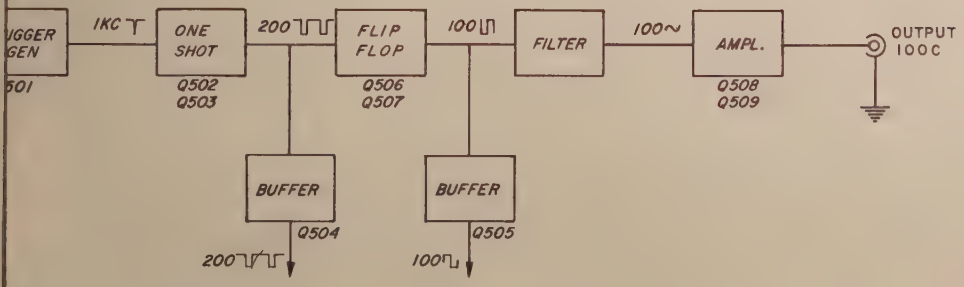
CAPACITANCE VALUES ONE AND OVER IN MICRO-MICROFARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED

⊘ SCREWDRIVER CONTROL

Block Diagram




BOTTOM VIEW
BASE
EM
COLL
2N169A
BASE
EM
COLL
2N404, 2N520A, 2N1374
R528
10K
TP502
R526
16K
LC501
IN
OUT
C
Q508
2N1374
Q509
2N1374
R530
620
R533
15K
OUTPUT
100 C
J501
C510
10µf
R527
20K
C509
5µf
R529
10K
R531
620
R532
33K

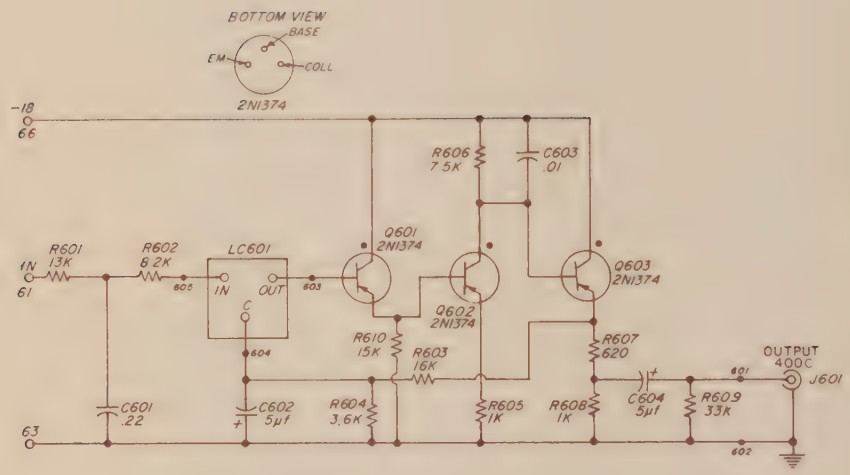

1KC
ONE SHOT
Q502
Q503
200
FLIP FLOP
Q506
Q507
100
FILTER
100~
AMPL.
Q508
Q509
OUTPUT
100C
BUFFER
Q504
BUFFER
Q505
200
100

Etched Board Layout, Type 1114-P6 400-CPS Plug-In Unit.

PARTS LIST

TYPE 1114-P6 400-CPS PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R601	Composition, 13kΩ ±5% 1/2w	6100-3135
R602	Composition, 8.2kΩ ±5% 1/2w	6100-2825
R603	Composition, 16kΩ ±5% 1/2w	6100-3165
R604	Composition, 3.6kΩ ±5% 1/2w	6100-2365
R605	Composition, 1kΩ ±5% 1/2w	6100-2105
R606	Composition, 7.5kΩ ±5% 1/2w	6100-2755
R607	Composition, 620Ω ±5% 1/2w	6100-1625
R608	Composition, 1kΩ ±5% 1/2w	6100-2105
R609	Composition, 33kΩ ±5% 1/2w	6100-3335
R610	Composition, 15kΩ ±5% 1/2w	6100-3155
	CAPACITORS	
C601	Wax, 22μf ±10% 1000dcwv	5010-3300
C602	Electrolytic, 5μf 50dcwv	4450-3900
C603	Ceramic, 0.01μf +80-20% 50dcwv	4401-3100
C604	Electrolytic, 5μf 50dcwv	4450-3900
	MISCELLANEOUS	
J601	CONNECTOR, Coaxial Type 874	0874-4501
LC601	FILTER	1114-0416
Q601	TRANSISTOR, Type 2N1374	8210-1374
Q602	TRANSISTOR, Type 2N1374	8210-1374
Q603	TRANSISTOR, Type 2N1374	8210-1374



NOTES

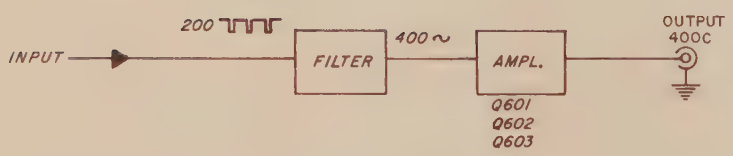
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED

RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED

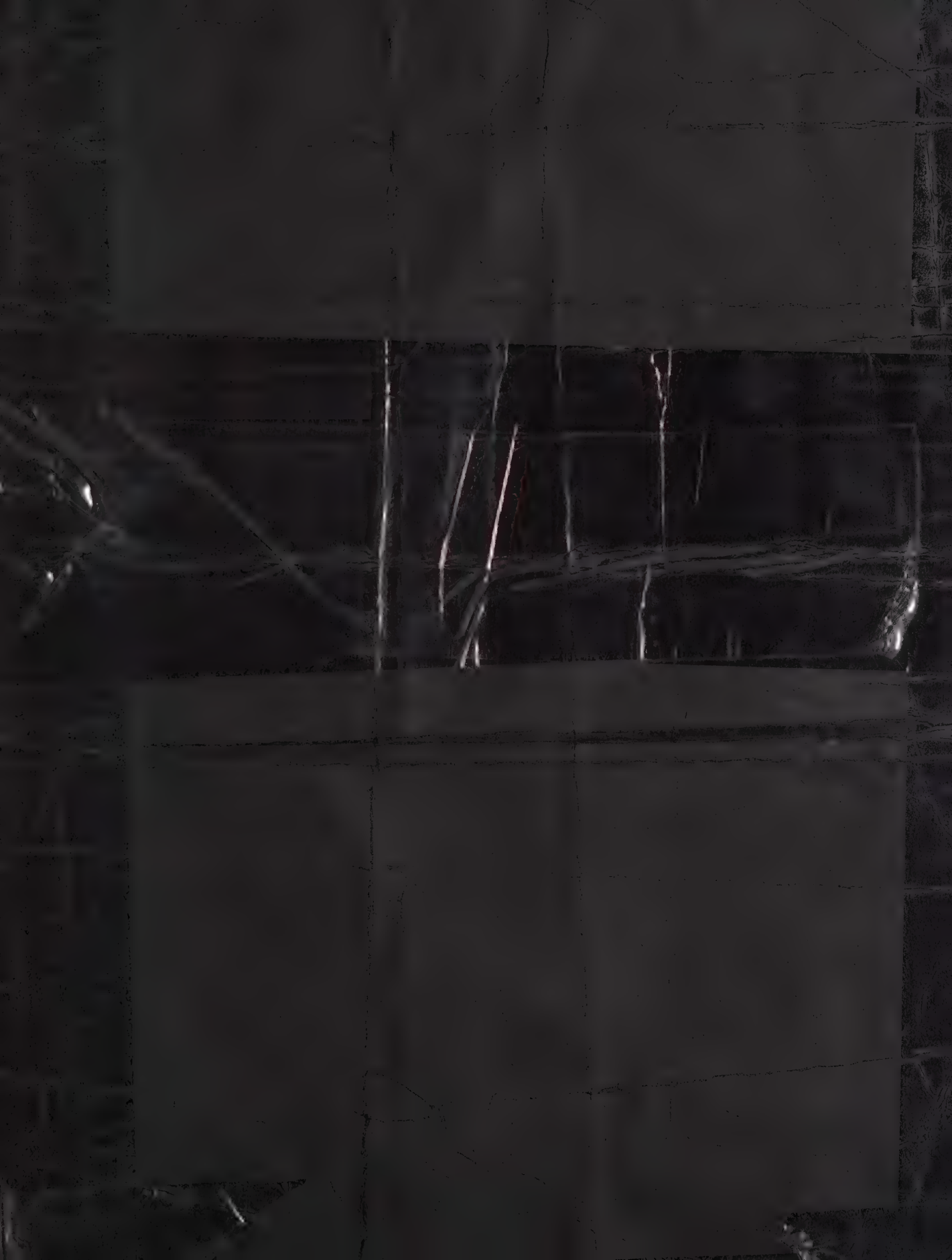
K=1000 M=1 MEGOHM

CAPACITANCE VALUES ONE AND OVER IN MICROMICROFARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.

Schematic Diagram, Type 1114-P6 400-CPS Plug-In Unit



Block Diagram



Etched Board Layout, Type 1114-P7 60-CPS Plug-In Unit.

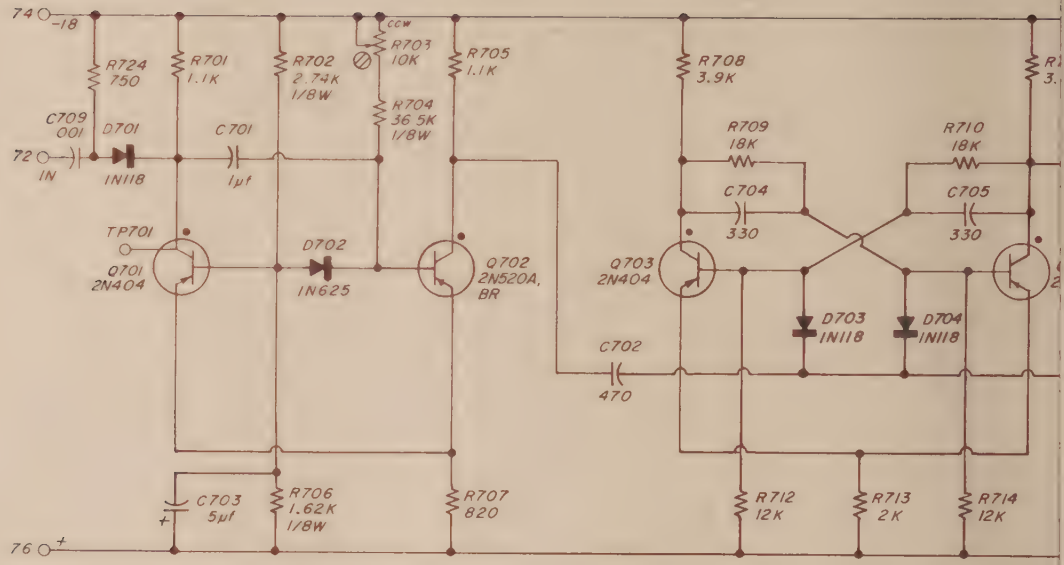
PARTS LIST

TYPE 1114-P7 60-CPS PLUG-IN UNIT

REF NO.	RESISTORS	PART NO.
R701	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R702	Film, 2.74kΩ ±1% 1/8w	6250-1274
R703	Potentiometer, Composition, 10kΩ ±20%	6040-0700
R704	Film, 36.5kΩ ±1% 1/8w	6250-2365
R705	Composition, 1.1kΩ ±5% 1/2w	6100-2115
R706	Film, 1.62kΩ ±5% 1/8w	6250-1162
R707	Composition, 820Ω ±5% 1/2w	6100-1825
R708	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R709	Composition, 18kΩ ±5% 1/2w	6100-3185
R710	Composition, 18kΩ ±5% 1/2w	6100-3185
R711	Composition, 3.9kΩ ±5% 1/2w	6100-2395
R712	Composition, 12kΩ ±5% 1/2w	6100-3125
R713	Composition, 2kΩ ±5% 1/2w	6100-2205
R714	Composition, 12kΩ ±5% 1/2w	6100-3125
R715	Composition, 10kΩ ±5% 1/2w	6100-3105
R716	Composition, 6.2kΩ ±5% 1/2w	6100-2625
R717	Composition, 5.6kΩ* ±5% 1/2w	6100-2565
R718	Composition, 10kΩ ±5% 1/2w	6100-3105
R719	Composition, 10kΩ ±5% 1/2w	6100-3105
R720	Composition, 470Ω ±5% 1/2w	6100-1475
R721	Composition, 1kΩ ±5% 1/2w	6100-2105
R722	Composition, 33kΩ ±5% 1/2w	6100-3335
R723	Composition, 15kΩ ±5% 1/2w	6100-3155
R724	Composition, 750Ω ±5% 1/2w	6100-1755

REF NO.	CAPACITORS	PART NO.
C701	Plastic, 1μf ±2% 100dcwv	4860-8251
C702	Ceramic, 470pf ±10%NM 500dcwv	4400-4775
C703	Electrolytic, 5μf 50dcwv	4450-3900
C704	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C705	Ceramic, 330pf ±10%NM 500dcwv	4400-4700
C706	Ceramic, 0.001μf ±20% 500dcwv	4404-2109
C707	Electrolytic, 5μf 50dcwv	4450-3900
C708	Electrolytic, 10μf 25dcwv	4450-3800
C709	Ceramic, 0.001μf ±20% 500dcwv	4404-2109
	MISCELLANEOUS	
D701	DIODE, Type 1N118A	6082-1006
D702	DIODE, Type 1N625	6082-1012
D703	DIODE, Type 1N118A	6082-1006
D704	DIODE, Type 1N118A	6082-1006
J701	CONNECTOR, Coaxial Type 874	0874-4501
LC701	FILTER	1114-0417
Q701	TRANSISTOR, Type 2N404	8200-4040
Q702	TRANSISTOR, Type 2N520A, BR	8210-5200
Q703	TRANSISTOR, Type 2N404	8200-4040
Q704	TRANSISTOR, Type 2N404	8200-4040
Q705	TRANSISTOR, Type 2N1374	8210-1374
Q706	TRANSISTOR, Type 2N1374	8210-1374

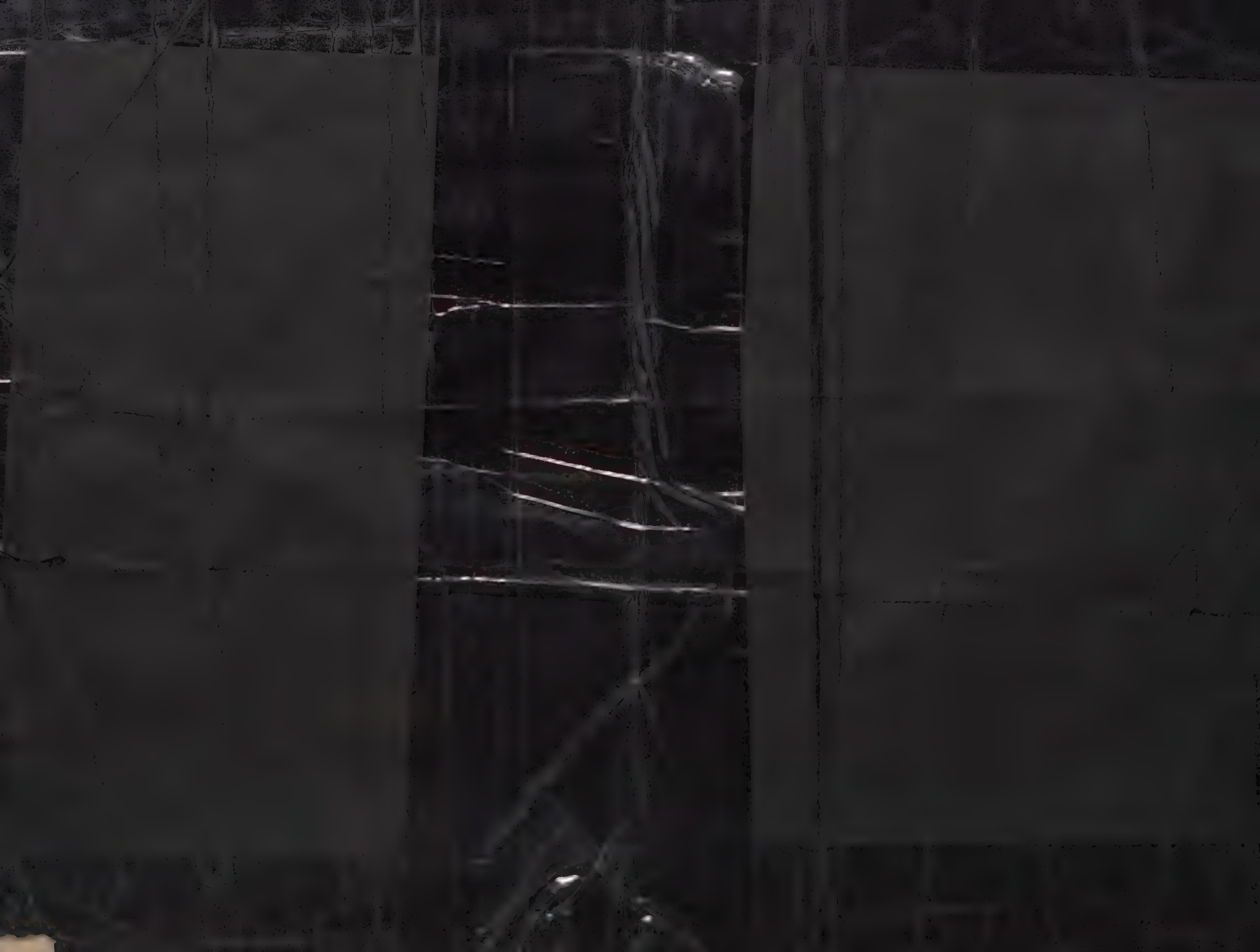
*Value may be changed at factory

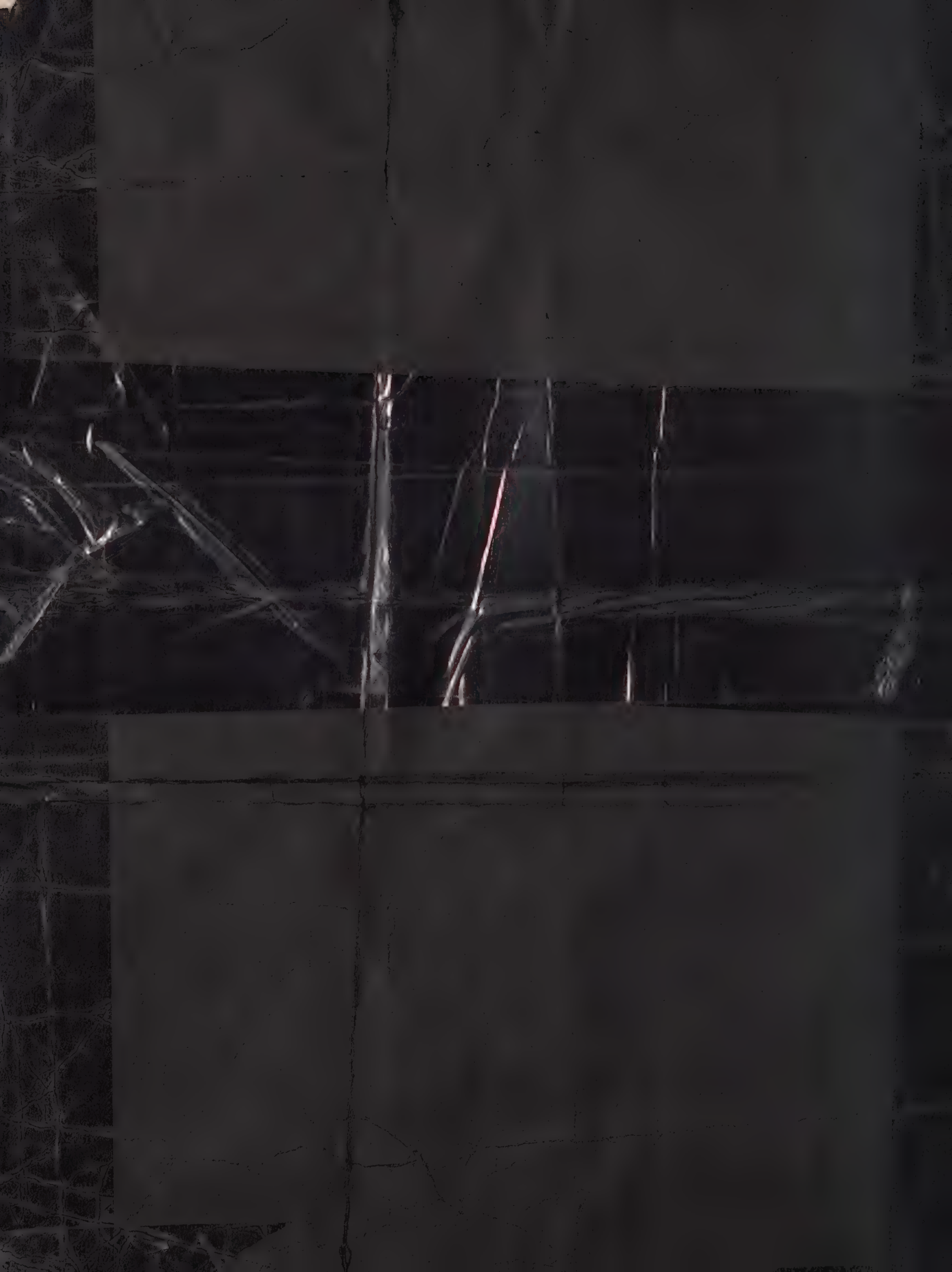


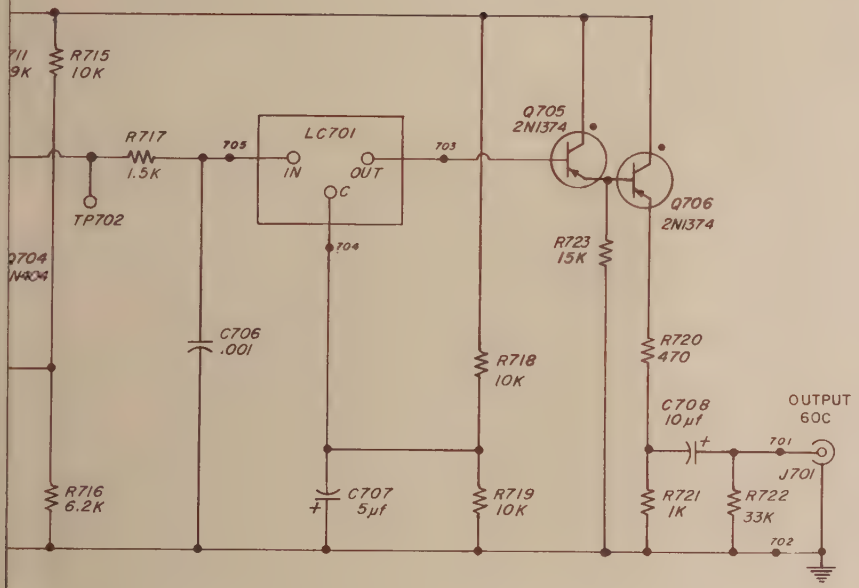
NOTE:
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K = 1000 M = 1 MEGOHM
CAPACITANCE VALUES ONE & OVER IN MICRO-MICRO-FARADS, LESS THAN ONE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
⊘ SCREWDRIVER CONTROL
ANCHOR TERMINALS USED: 701, 702, 703, 704, 705

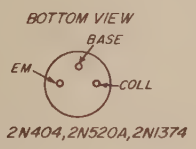
Block Diagram

INPUT → 200






R715
10K
R717
1.5K
705
LC701
IN
OUT
C
703
TP702
704
Q705
2N1374
Q706
2N1374
R723
15K
C706
.001
R718
10K
R720
470
C708
10μf
OUTPUT
60C
701
J701
R716
6.2K
C707
5μf
R719
10K
R721
1K
R722
33K
702

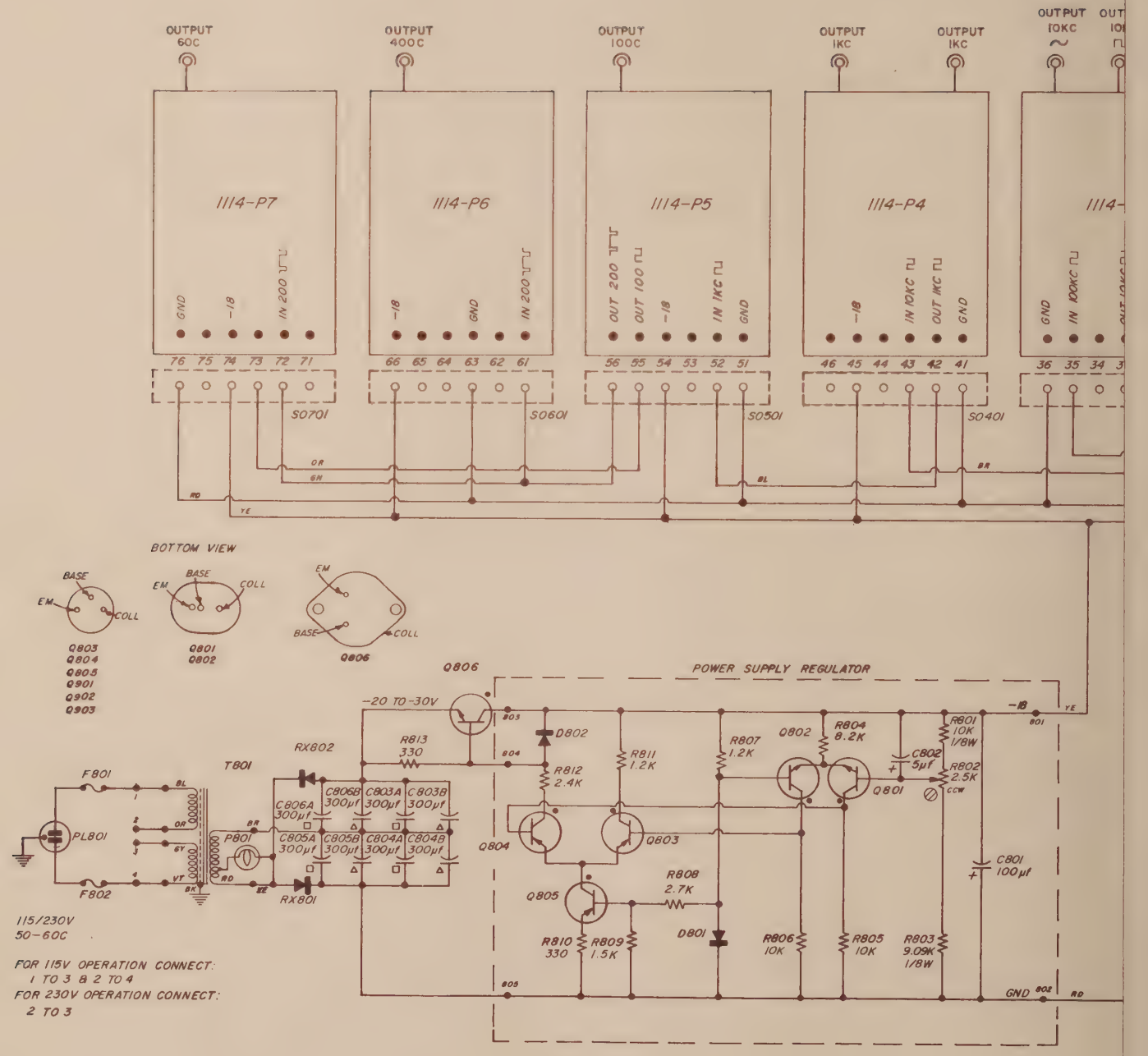

BOTTOM VIEW
BASE
EM
COLL
2N404, 2N520A, 2N1374

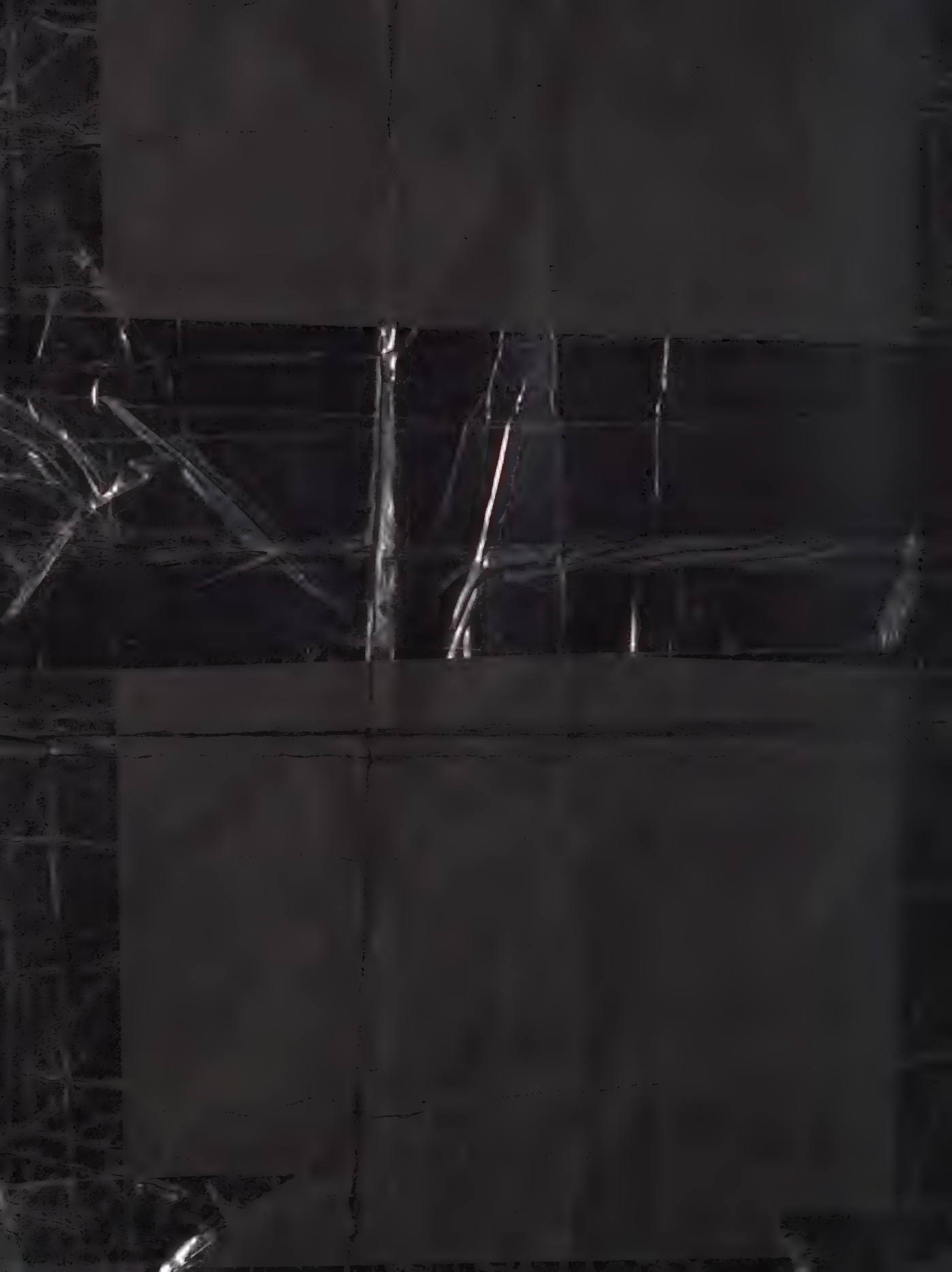
ONE SHOT
Q701
Q702
40
FLIP FLOP
Q703
Q704
20
FILTER
60 ~
AMPL.
Q705
Q706
OUTPUT
60C

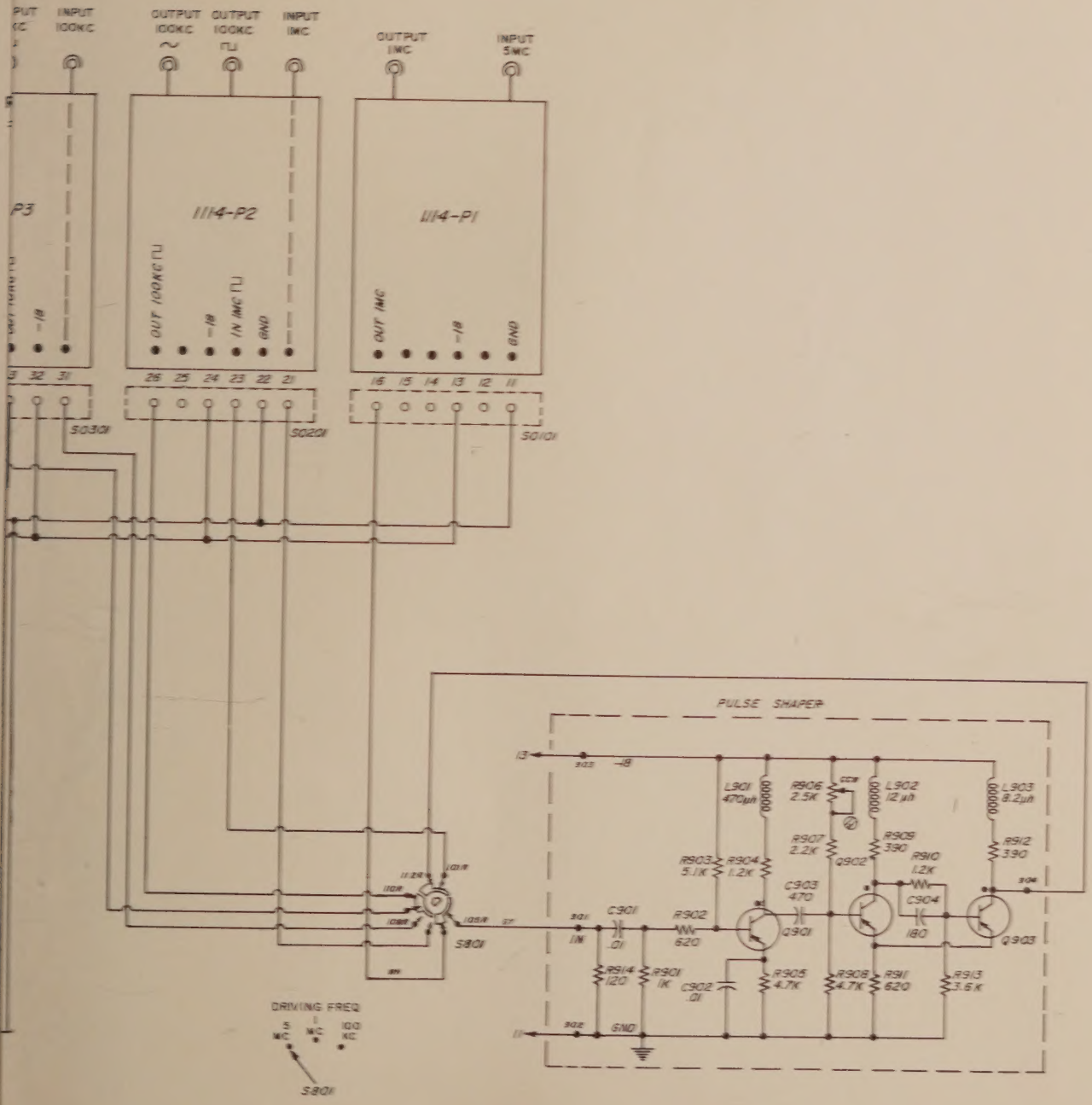
PARTS LIST
TYPE 1114-A FREQUENCY DIVIDER

REF NO.	RESISTORS	PART NO.
R801	Film, 10kΩ ±1% 1/8w	6250-2100
R802	Potentiometer, Composition, 2.5kΩ ±20%	6040-0500
R803	Film, 9.09kΩ ±1% 1/8w	6250-1909
R804	Composition, 8.2kΩ ±5% 1/2w	6100-2825
R805	Composition, 10kΩ ±5% 1/2w	6100-3105
R806	Composition, 10kΩ ±5% 1/2w	6100-3105
R807	Composition, 1.2kΩ ±5% 1/2w	6100-2125
R808	Composition, 2.7kΩ ±5% 1/2w	6100-2275
R809	Composition, 1.5kΩ ±5% 1/2w	6100-2155
R810	Composition, 330Ω ±5% 1/2w	6100-1335
R811	Composition, 1.2kΩ ±5% 1/2w	6100-2125
R812	Composition, 2.4kΩ ±5% 1/2w	6100-2245
R813	Composition, 330Ω ±5% 1/2w	6100-1335
R901	Composition, 1kΩ ±5% 1/2w	6100-2105
R902	Composition, 680Ω ±5% 1/2w	6100-1685
R903	Composition, 5.1kΩ ±5% 1/2w	6100-2515
R904	Composition, 1.2kΩ ±5% 1/2w	6100-2125
R905	Composition, 4.7kΩ ±5% 1/2w	6100-2475
R906	Potentiometer, Composition, 2.5kΩ ±20%	6040-0500
R907	Composition, 2.2kΩ ±5% 1/2w	6100-2225
R908	Composition, 4.7kΩ ±5% 1/2w	6100-2475
R909	Composition, 390Ω ±5% 1/2w	6100-1395
R910	Composition, 1.2kΩ ±5% 1/2w	6100-2125
R911	Composition, 620Ω ±5% 1/2w	6100-1625
R912	Composition, 390Ω ±5% 1/2w	6100-1395
R913	Composition, 3.6kΩ ±5% 1/2w	6100-2365
R914	Composition, 120Ω ±5% 1/2w	6100-1125
	CAPACITORS	
C801	Electrolytic, 100µf 25dcwv	4450-2300
C802	Electrolytic, 5µf 50dcwv	4450-3900
C803	Electrolytic, 300µf 15dcwv Electrolytic, 300µf 15dcwv	4450-2400
C804	Electrolytic, 300µf 15dcwv Electrolytic, 300µf 15dcwv	4450-2400
C805	Electrolytic, 300µf 15dcwv Electrolytic, 300µf 15dcwv	4450-2400

REF NO.	CAPACITORS	PART NO.
C806	Electrolytic, 300µf 15dcwv Electrolytic, 300µf 15dcwv	4450-2400
C901	Ceramic, 0.01µf +80-20% 50dcwv	4401-3100
C902	Ceramic, 0.01µf +80-20% 50dcwv	4401-3100
C903	Ceramic, 470pf ±20% 500dcwv	4404-1479
C904	Ceramic, 180pf ±10% 500dcwv	4404-1188
	MISCELLANEOUS	
D801	DIODE, Type SV129	6083-1010
D802	DIODE, Type 1N966	6083-1015
F801	FUSE for 115v: Slo-Blo, 1/10a for 230v: Slo-Blo, 1/16a	5330-0400 5330-0300
F802	FUSE for 115v: Slo-Blo, 1/10a for 230v: Slo-Blo, 1/16a	5330-0400 5330-0300
L901	CHOKE, Metal 470µh ±10%	4300-4890
L902	CHOKE, Metal 12µh ±10%	4300-2300
L903	CHOKE, Metal 8.2µh ±10%	4300-2100
P801	PILOT LIGHT, Mazda No. 44	5600-0700
Q801	TRANSISTOR, Type 2N169A	8210-1692
Q802	TRANSISTOR, Type 2N169A	8210-1692
Q803	TRANSISTOR, Type 2N1374	8210-1374
Q804	TRANSISTOR, Type 2N1374	8210-1374
Q805	TRANSISTOR, Type 2N1374	8210-1374
Q806	TRANSISTOR, Type 2N1218	8210-1218
Q901	TRANSISTOR, Type 2N582	8210-5820
Q902	TRANSISTOR, Type 2N711A	8210-7111
Q903	TRANSISTOR, Type 2N711A	8210-7111
RX801	RECTIFIER, Type 1N3253	6081-1001
RX802	RECTIFIER, Type 1N3253	6081-1001
S801	SWITCH, Rotary Wafer	7890-2090
T801	TRANSFORMER	0745-4200


OUTPUT 60C
OUTPUT 400C
OUTPUT 100C
OUTPUT 1KC
OUTPUT 1KC
OUTPUT 10KC
1114-P7
1114-P6
1114-P5
1114-P4
GND
-18
IN 200
OUT 200
OUT 100
IN 1KC
OUT 1KC
IN 10KC
76 75 74 73 72 71
66 65 64 63 62 61
56 55 54 53 52 51
46 45 44 43 42 41
S0701
S0601
S0501
S0401
OR
GN
RD
YE
BL
BR
BOTTOM VIEW
BASE
EM
COLL
Q803
Q804
Q805
Q901
Q902
Q903
Q801
Q802
Q806
POWER SUPPLY REGULATOR
-20 TO -30V
R813 330
D802
R812 2.4K
R811 1.2K
R807 1.2K
R804 8.2K
R801 10K 1/8W
C802 5μf
R802 2.5K CCW
C801 100μf
R808 2.7K
D801
R810 330
R809 1.5K
R806 10K
R805 10K
R803 9.09K 1/8W
RX802
RX801
T801
P801
F801
F802
PL801
C806A 300μf
C806B 300μf
C803A 300μf
C803B 300μf
C805A 300μf
C805B 300μf
C804A 300μf
C804B 300μf
115/230V
50-60C
FOR 115V OPERATION CONNECT:
1 TO 3 & 2 TO 4
FOR 230V OPERATION CONNECT:
2 TO 3




INPUT 100KC
OUTPUT 100KC
OUTPUT 100KC
INPUT 1MC
OUTPUT 1MC
INPUT 5MC
1114-P2
1114-P1
P3
OUT 100KC
IN 1MC
GND
OUT 1MC
S3031
S3021
S3011
PULSE SHAPER
L901 470μh
L902 12 μh
L903 3.2μh
R906 2.5K
R907 2.2K
R909 390
R910 1.2K
R912 390
R903 5.1K
R904 1.2K
Q902
C903 470
C904 180
Q901
Q903
C901 .01
R902 620
R914 120
R901 1K
C902 .01
R905 4.7K
R908 4.7K
R911 620
R913 3.6K
GND
S801
DRIVING FREQ.
5 MC
1 MC
100 KC
S801

TYPE 874 COAXIAL COMPONENTS

TYPE 874 CABLE CONNECTORS

APPLICABLE CABLE TYPES	CONNECTOR TYPE	CABLE	CABLE LOCKING	PANEL FLANGED	PANEL LOCKING	PANEL LOCKING RECESSED
	874-A2	-CA	-CLA	-PBA	-PLA	-PRLA
50-OHM	RG-8A/U RG-9B/U RG-10A/U RG-87A/U RG-116/U RG-156/U RG-165/U RG-166/U RG-213/U RG-214/U RG-215/U RG-225/U RG-227/U	-C8A	-CL8A	-PB8A	-PL8A	-PRL8A
NON-50-OHM	RG-11A/U RG-12A/U RG-13A/U RG-63B/U RG-79B/U RG-89/U RG-144/U RG-146/U RG-149/U RG-216/U					
50-OHM	874-A3 RG-29/U RG-55/U (Series) RG-58/U (Series) RG-141A/U RG-142A/U RG-159/U RG-223/U	-C58A	-CL58A	-PB58A	-PL58A	-PRL58A
NON-50-OHM	RG-59/U RG-62/U (Series) RG-71B/U RG-140/U RG-210/U	-C62A	-CL62A	-PB62A	-PL62A	-PRL62A
50-OHM	RG-174/U RG-188/U RG-316/U	-C174A	-CL174A	-PB174A	-PL174A	-PRL174A
NON 50-OHM	RG-161/U RG-187/U RG-179/U					

Example: For a locking cable connector for RG-8A/U, order Type 874-CL8A.

TYPE 874 ADAPTORS

TO TYPE		874-
BNC	plug	QBJA QBJL*
	jack	QBPA
C	plug	QCJA QCJL*
	jack	QCP
HN	plug	QHJA
	jack	QHPA
LC	plug	QLJA QLPA
LT	plug	QLTJ
	jack	QLTP
Microdot	plug	QMDJ QMDJL*
	jack	QMDP
N	plug	QNJA QNJL*
	jack	QNP
SC (Sandia)	plug	QSCJ QSCJL*
	jack	QSCP
TNC	plug	QTNJ QTNJL*
	jack	QTNP
UHF	plug	QUJ QUJL*
	jack	QUP
UHF	7/8-in.	QU1A
50-Ω	1-5/8-in.	QU2
Air Line	3-1/8-in.	QU3A

*Locking Type 874 Connector.

Example: To connect Type 874 to a Type N jack, order Type 874-QNP.

CONNECTOR ASSEMBLY TOOLS

TYPE 874-	FUNCTION
TOK	Tool Kit
TO58	Crimping Tool
TO8	Crimping Tool

OTHER COAXIAL ELEMENTS

TYPE 874-		TYPE 874-	
A2	50 Ω cable (low loss)	LR	radiating line
A3	50 Ω cable	LTL	trombone constant-Z line
D20L, D50L	20-, 50-cm adjustable stubs	ML	component mount
EL, EL-L	90° ell	MB	coupling probe
F185L	185-Mc low-pass filter	MR, MRL	mixer-rectifier
F500L	500-Mc low-pass filter	R20A, R20LA	patch cord, double coax
F1000L	1000-Mc low-pass filter	R22A, R22LA	patch cord, double coax
F2000L	2000-Mc low-pass filter	R33	patch cord, single coax
F4000L	4000-Mc low-pass filter	R34	patch cord, single coax
G3, G3L		T, TL	tee
G6, G6L	3-, 6-, 10-, & 20-db attenuators	UBL	balun
G10, G10L		VCL	variable capacitor
G20, G20L		VI	voltmeter indicator
GAL	adjustable attenuator	VQ, VQL	voltmeter detector
H500L	isolator	VR, VRL	voltmeter rectifier
H1000L	isolator	W100	100-Ω termination
H2000L	isolator	W200	200-Ω termination
JR	rotary joint	W50, W50L	50-Ω termination
K, KL	coupling capacitor	WN, WN3	short-circuit terminations
L10, L10L	10-, 20-, & 30-cm rigid air lines	WO, WO3	open-circuit terminations
L20, L20L		X	insertion unit
L30, L30L		XL	series inductor
LAL	33-58 cm adjustable line	Y	cliplock
LK10L, LK20L	constant-Z adjustable lines	Z	stand

MISCELLANEOUS COAXIAL CONNECTORS

CONNECTOR TYPE	TYPE NO.	USED WITH
Basic	874-B	50-ohm Air Line
Basic Locking	874-BL	50-ohm Air Line
Panel Locking	874-PLT	Wire Lead
Panel Locking Recessed	874-PRLT	Wire Lead
Panel Locking Feedthrough	874-PFL	Type 874 Patch Cords

L suffix indicates locking Type 874 Connector.

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